Metal Finishing

POLISHING AND BUFFING · BARREL FINISHING · CLEANING
PLATING · ANODIZING · RUST PROOFING · LACQUERING & ENAMELING

MARCH, 1958

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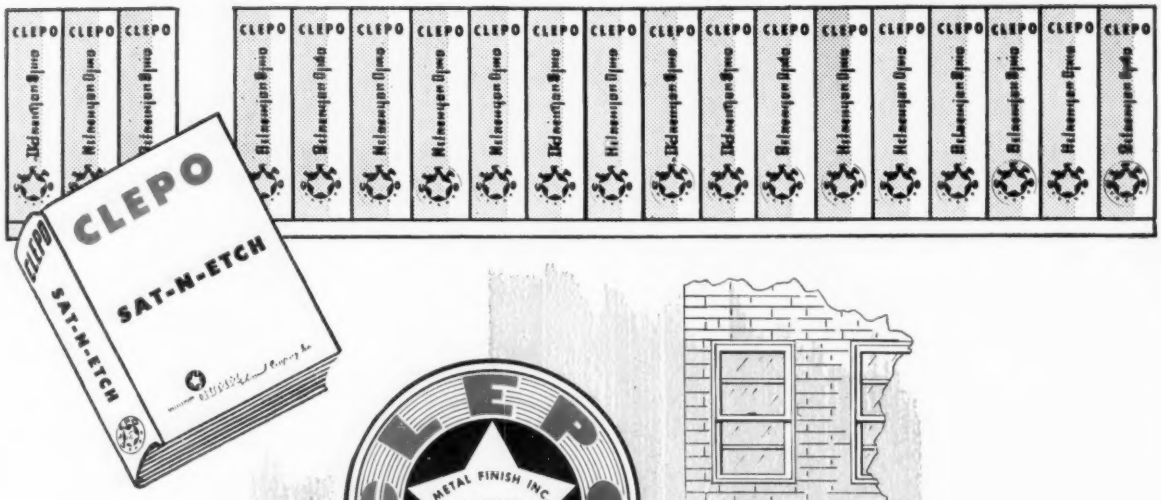
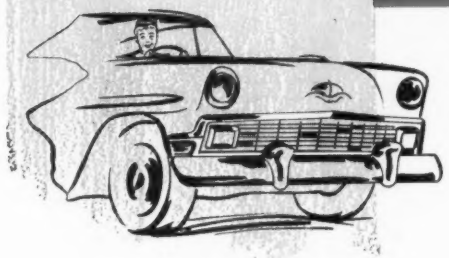


SAT-N-ETCH



...a treatment of interest to producers of aluminum articles

SAT-N-ETCH actually imparts a 'finish' to an aluminum surface. It produces an attractive silvery appearance on wrought or sheet aluminum.

SAT-N-ETCH is a two-step process. The first step is to treat the metal with CLEPO 30-R, an etchant that is fast, efficient, non-scaling and long-lasting. This step creates the desired finish. The second step is to clean the etched surface of smut and at the same time make it passive. This is the job of CLEPO 180-K which, incidentally, is a free-flowing powder.

So much for CLEPO SAT-N-ETCH. We have other products useful to processers of aluminum: pre-anodized cleaners, pre-welding cleaners, anodic film strippers, deburring, burnishing and other formulations. Ask the CLEPO field service man about not only CLEPO SAT-N-ETCH but the extensive CLEPO Line for Treating Aluminum. He knows thoroughly the treating and cleaning of aluminum. Perhaps he could be of help.

In addition to formulations for treating and cleaning aluminum, the CLEPO Line gets into the cleaning, stripping, deburring and other treatments of *all* metals. The CLEPO Field Service man will be glad to discuss your problem.

FREDERICK GUMM *Chemical Company Inc.*

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How to make metal blackening an exact science: What metal do you have to blacken? Steel, copper, brass, zinc? There are seven Ebonol® compounds in Enthone's specially developed series of blackeners for you to call on for jet blackness, maximum wear resistance and adhesion. Enthone is exceptionally well equipped and qualified to assist you in all phases of metal finishing. Years of practical experience, extensive research and service laboratory facilities manned by a team of specialists in the finishing field are at your service. Write us about your needs or problems. Send a sample of your product in question, if possible. Enthone, Inc., 442 Elm St., New Haven 11, Conn.

ENTHONE

ENTHONE, INC. IS A SUBSIDIARY OF AMERICAN SMELTING AND REFINING COMPANY

58-2

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year after year has manufactured Reliance Plating, Polishing Equipment, Supplies for Better and More Profitable Metal Finishing

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Independent spindles—each with separate patented Variable Speed Drive and controls — ball-bearing throughout. Powered by two up to 15 H.P. motors. Adopted by leading manufacturers as standard equipment.

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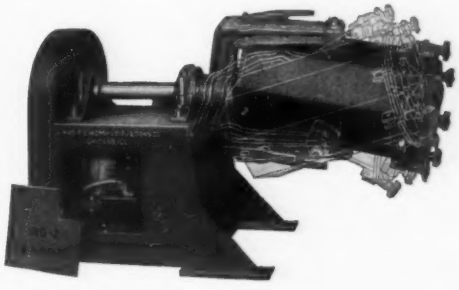
Longer pieces finished more uniformly and without bending.



DURABILITY
PRODUCTION
ECONOMY
EFFICIENCY

RELIANCE NUWAY BUFFS FOR FAST CUTTING

RELIANCE EXTRUDED COMPOSITIONS
STANDARD SIZE 2 x 2 x 10"

THEY CUT
THEY CLEAN
THEY COLOR

THE ANSWER TO INCREASED PRODUCTION AT LOWER COSTS

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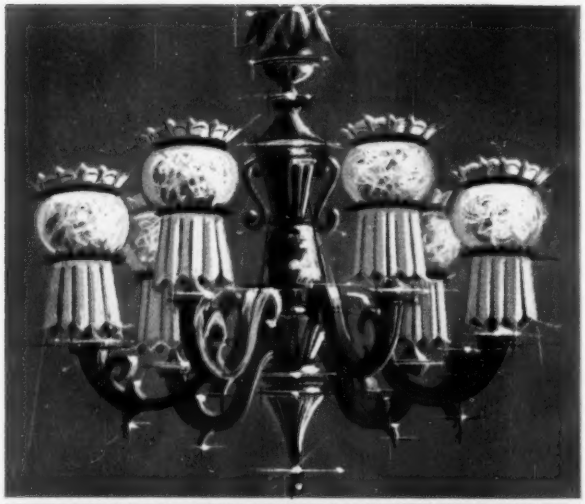
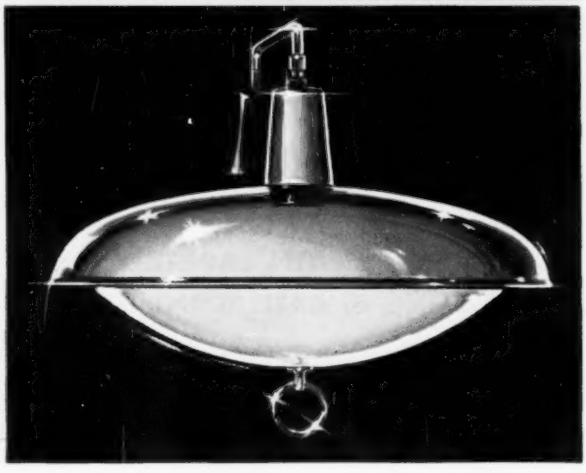
Since the days of the ornate chandelier





A shining, luxurious chandelier was much admired back in 1910. Its lustrous finish added elegance to any room. But that luster caused manufacturers plenty of problems—finishing problems that had to be solved efficiently and economically. For the solutions, manufacturers turned to Acme. And they're still relying on Acme engineers for the answers.

Reduction of costly rejects, increased volume of production, complete machine finishing of odd-shaped pieces . . . these are a few of the solutions Acme engineering has provided.

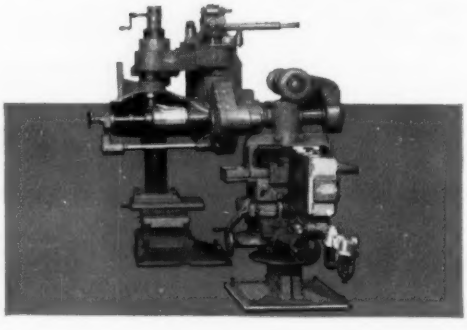
Today Acme progressive engineering builds equipment to polish and buff metal faster—and better, too. And at lower cost, because Acme engineers combine standard units with a wide variety of accessories to make *custom* machines.

Every year of its history, Acme has solved new finishing problems for many industries and manufacturers. Let us help you solve *yours*.

ACME MANUFACTURING COMPANY

1400 E. 9 MILE ROAD, DETROIT 20, MICHIGAN

LEADING PRODUCERS OF AUTOMATIC POLISHING AND BUFFING EQUIPMENT SINCE 1910



Acme special semi-automatic machine with E-10 oscillating fixture arrangement used with Acme G-3 buffing lathe. One operator normally handles two units for most efficient production.

LET ACME *Polish Off* **YOUR FINISHING PROBLEMS**

Hard -- Tough -- Long-lasting -- no sharp edges or flat spots

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TRADE MARK

TUMBLING ABRASIVE

Borolon is fused crystalline aluminum oxide abrasive chips, *pre-tumbled* to give you a "run-in" media ready for top efficiency right away. Each chip particle is dense and solid, with multiple abrasive surfaces. New sizing standards provide wider range, greater accuracy. For all types of tumbling equipment—Send for bulletin ESA 236.

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For extreme accuracy in masking parts for all plating cycles.

MICCROMASK

Provides complete masking protection for hard chromium plating.

MICCROPEEL

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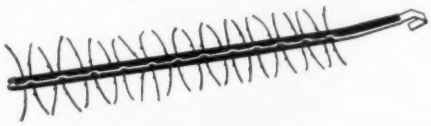
MICCROWAX

Two waxes widely used for selective stop-off. C-562 for hard chromium; C-600 for high-temperature cycles.

MICCROTEX

An air-dry rack coating for all plating cycles. Excellent for patching and repairing.



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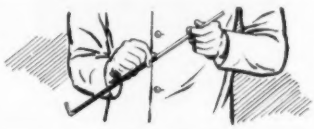
An extruded tape which provides unexcelled protection for plating racks, and for masking parts prior to selective plating.

MICCROTUBE

Extruded tubing especially suited for use on contact wires, and for selective plating of simple parts.



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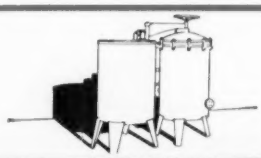

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This policy of research and testing has rewarded the plating industry with Conducta-Core lead anodes which have greater throwing power, yet last three or four times longer than other lead anodes. Cadmax, addition agent for cadmium plating, is another example of superior materials. So too is Zimax for zinc plating, Nimax, a nickel plating brightener, and new Conmax, a conversion coating for cadmium and zinc plated parts. All do a better job at lower cost.

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AMERICAN SMELTING AND REFINING COMPANY

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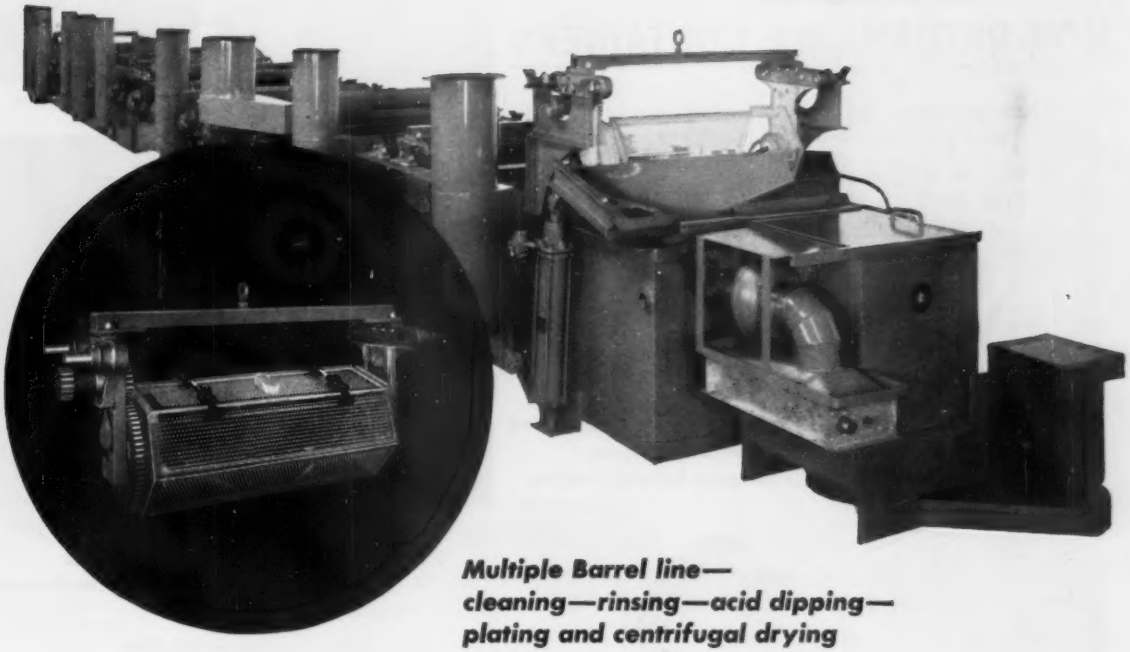

Multiple Barrel line—
cleaning—rinsing—acid dipping—
plating and centrifugal drying

CROWN LUCITE CYLINDERS

Can be operated through the entire cycle
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Whether your production requires a single barrel
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YOU SAVE WORK AND TIME!

- Light container—easy to handle even when full
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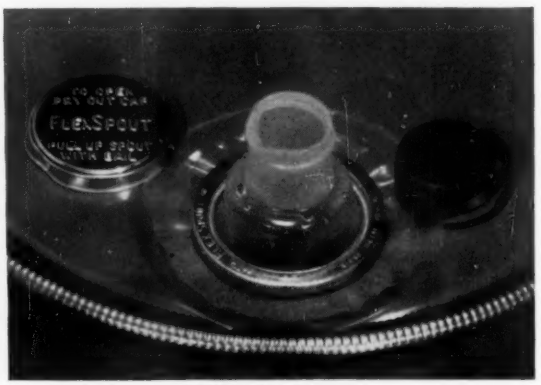
- Built-in (pull out-push in) spout
- Specially designed for easy stacking

Convenient Stacking

Polyethylene Liner



Pull Out-Push In Spout

These Harshaw fluoborate chemicals are now shipped in non-returnable containers:

Cadmium Fluoborate Solution
Copper Fluoborate Solution
Fluoboric Acid
Hydrofluosilicic Acid
Lead Fluoborate Solution
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Enter your order today—the same high quality Harshaw fluoborates, and in a convenient new container.

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Facts to consider when you're buying

Chromate Conversion Coatings

for Corrosion Protection, Paint Base, Decorative Finishing

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002″ max.) gel-like, complex chromate film of a nonporous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

If your company is manufacturing or buying parts or complete assemblies made from or plated with any of the more common non-ferrous metals—zinc, cadmium, aluminum, magnesium, silver, copper, brass or bronze—you've probably already run up against the question of finishing these surfaces with a chromate conversion coating. These coatings are used to protect against corrosion, or to provide a base for paint or to provide a decorative finish for sales appeal or shelf life. Since chromate conversion coatings represent a relatively new means of obtaining these finishes, this digest of facts to consider may be of value to you.

1. THE COATINGS THEMSELVES. There are many brands on the market. All are similar in many ways. Each, of course, offers its own specific advantages and these may relate to operating techniques, performance under actual use conditions, cost, availability, etc. Naturally, you'll want to choose a coating that is widely known and accepted under both military and civilian specifications.

2. THE COMPANY BEHIND THE PRODUCT. Is it a reliable, established organization? Does it offer experienced technical service, both from the field-engineering organization as well as the home office and laboratories? The man who sells and services your installation should be thoroughly familiar with not only chromate conversion coatings and their applications, but also with the characteristics and performance of related finishing operations such as precleaning, electroplating, painting, etc. This is most important since all steps of the finishing cycle must be functioning properly for the satisfactory performance of the ultimate finish produced.

3. AVAILABILITY OF THE PRODUCT. Ideally, of course, the material should be readily available to you from nearby warehouses to avoid time loss in long distance shipping and to provide emergency service, should the need arise.

4. COST. Naturally, the initial price of the material is important to you. However, just as you consider ultimate cost when you are buying mechanical equipment, ultimate cost must be considered for these finishing chemicals. So, it will pay you to investigate consumption costs, labor costs and the other factors which go into the determination of ultimate cost. Further, cost alone gives no indication of product performance, so careful attention must be given to the purpose the finish must serve and the value that finish will add to your product.

5. FACILITIES FOR RESEARCH AND DEVELOPMENT. Perhaps the existing types of chromate conversion coatings do not include a compound that will accomplish exactly what you wish. Then, it is important to deal with a supplier who has adequate research and development facilities available to work with you to produce a material to meet your needs. Naturally, such a project is seldom completed overnight. But, with complete cooperation and confidence from both you and your supplier, chances are a satisfactory program can be completed.

These are the concepts of sales and service on which we, Allied Research Products, Incorporated, have developed and marketed the line of Iridite chromate conversion coatings . . . superior product performance, complete sales and technical service, easy product availability, economical cost, extensive research and development facilities. No doubt you are familiar with our line and have seen this trademark—

IRIDITE®

—in our advertising, technical literature or on shipping containers in your plant. Remember this trademark when you're buying or investigating chromate conversion coatings for your company. It's your assurance of quality, economical products from a reliable and established company, skilled sales and technical service from both our home office and a national network of representatives, immediate availability from warehouses in strategic industrial areas and our willingness to work with you to develop new finishes to meet your needs, should the present line fall short.

For complete information on Iridite chromate conversion coatings, write today for your free copy of our technical data file. Or, for immediate advice, call in your Allied Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

ALLIED RESEARCH PRODUCTS
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Manufacturers of Iridite chromate conversion coatings for corrosion resistance, paint systems, final finishing of non-ferrous metals; ARP Plating Brightener & Chemicals. West Coast Licensee—L. H. Butcher Co.

(ADVERTISEMENT)

A Timely Message on

"Is Fast Fast Enough?"

by Ben P. Sax

Chairman of the Board, *American Buff Company*

We Americans have long believed in and prided ourselves on our fast pace . . . at our work . . . in our leisure . . . and in our progress to leadership in many fields.

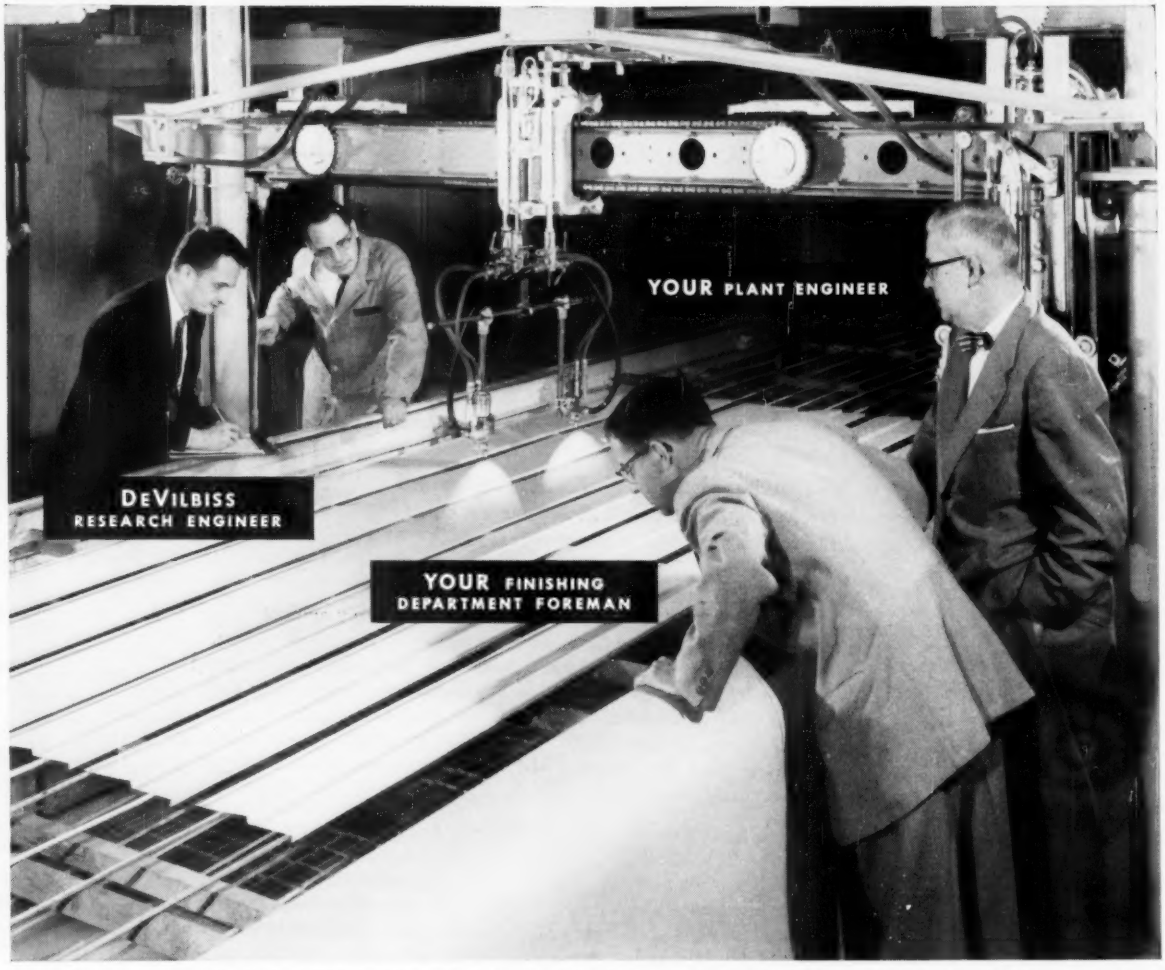
However, all speed is relative. Now it is uncomfortably evident that, like Alice in Wonderland, we must run ever faster than before, merely to stay where we are in relation to the Soviet's amazing record of accomplishment. From a position abysmally low compared to our long-established leadership in all fields, the Soviet's rate of growth has been so fantastic that, unless we immediately and materially increase our pace, her progress will soon outstrip our precarious, yet present security lead.

It is up to every one of us to contribute to America's ability to stay ahead, with all the advantages of the liberty which we take so casually for granted. In education, scientific advances, peace and war material; in time, money and personal restrictions if necessary, each must play his part. Speed is of the essence — both in developments in every field, and in our putting them into operation.

Our company's contributions to faster, lower-cost output in the metal finishing industry are augmented by a policy of sharing in the endeavors and sacrifices and responsibilities which every industry, every scientist, student, every citizen must assume and carry in order to retain our priceless heritage and future of liberty.

Sincerely,

Ben P. Sax



Your staff can see your product painted on DeVilbiss automatic machine under simulated plant conditions.

Try automatic painting before you buy!

A test run in the DeVilbiss research laboratory gives you facts to guide your decision

The only way to be sure if change-over to fully automatic painting is the *right step* is an actual test under identical production conditions and using the exact materials you normally apply.

That's why more and more manufacturers are having us schedule trial production runs in our fully equipped research laboratory.

Working to your coating specifications, we duplicate your plant conditions in every possible way. Then we test-run your product on the best suited standard automatic spray machine. Your supervisors are invited to be there; results are passed along to you.

Thus, you know *before* making any equipment purchases or shop modifications if it will pay you to paint automatically!

To arrange a test run, contact your nearest DeVilbiss representative or write us in Toledo. DeVilbiss offers automatic spray machines for painting products of practically any size or shape, and for use with most conveyor systems . . . the *only* automatics capable of spraying inside deep cavities, as well as uniformly coating exterior surfaces.

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DEVILBISS

A smooth, flawless finish in this mold plated by Nutmeg Chrome Corp. assures an equally flawless finish in molded melamine dishwear. Nutmeg considers the finish of this force and cavity, hard-plated with Mutual Chromic Acid, "about the highest lustre obtainable on any surface."

For perfect plating every time use Mutual *LOW SULFATE* Chromic Acid

When only a perfect finish will do, the purity of Mutual Chromic Acid is one safeguard against plating difficulties . . . and against expensive rejects!

Mutual Chromic Acid is always 99.75% pure – or better. Sulfate content never exceeds 0.1%. Rigid quality control by Mutual insures that the chromic acid you get is always the same. This makes it easy for you to control accurately the acid-sulfate ratio of your plating bath.

To learn more about these and other advantages of Mutual Chromic Acid, send today for "Chromium Chemicals." This booklet gives full technical information on the entire line of Mutual Products. Mutual's Technical Service Staff will also be happy to offer help and information at any time.

Mutual Chromium Chemicals

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Sodium Bichromate
Sodium Chromate
Chromic Acid

Potassium Bichromate
Potassium Chromate
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Chromium Chemicals – Their History, Properties and Uses.

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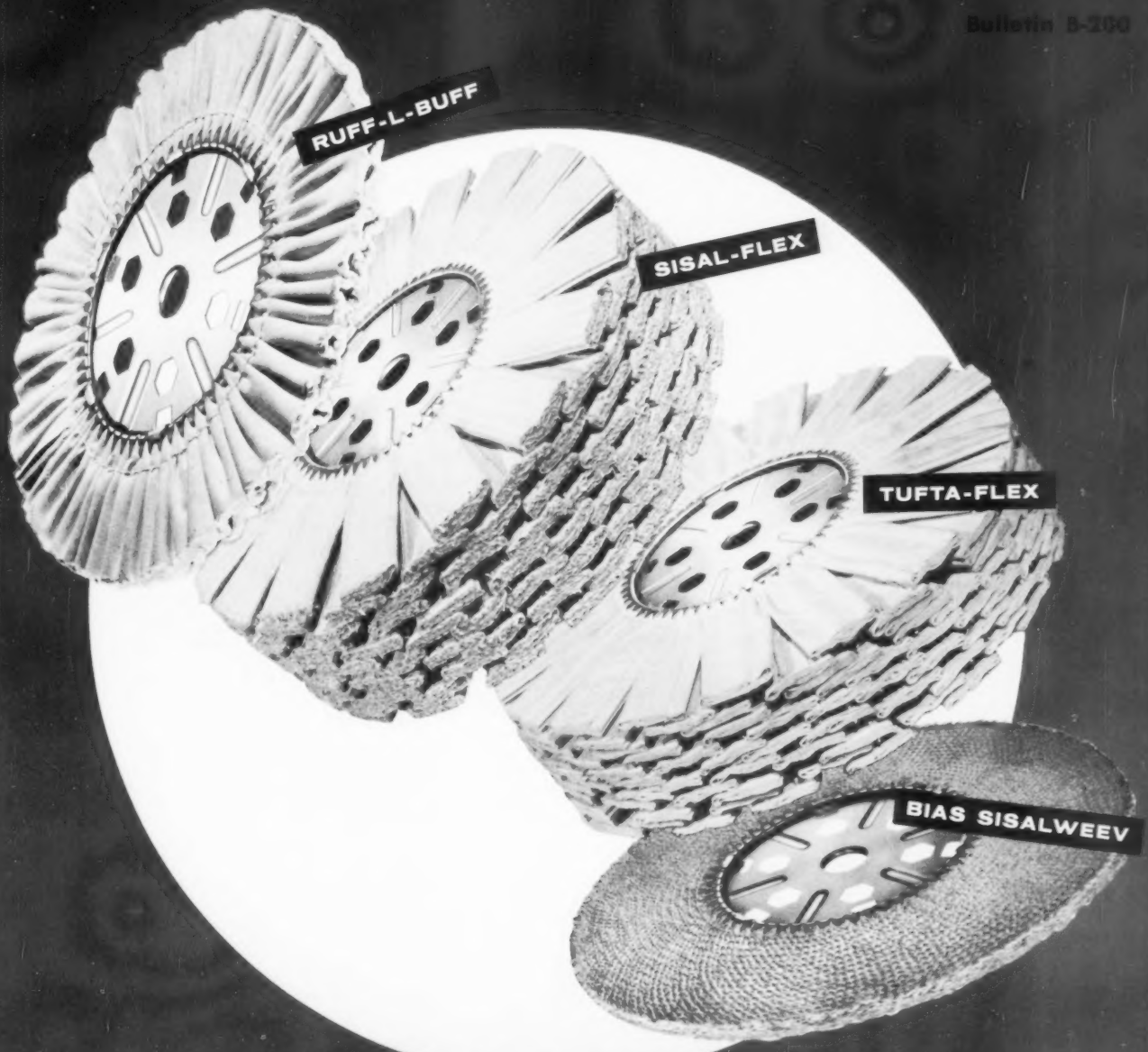


H-VW-M

"Job-Tailored" BUFFS

H-VW-M

HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, NEW JERSEY

NEW

H-VW-M "Job-Tailored" BUFFS

Now H-VW-M matches the BUFF to the JOB! You save time and money... get better quality on *any* job!

For SUPER-HEAVY CUT ALL METALS

Binderized*

RUFF-L-BUFFS®

Tests proved they *cut faster, last 30% longer — in heaviest service.* They're impregnated with buffing compound binder that protects and lubricates every fibre.

No heading-up time! The binder makes the buff "take" compound on contact, and go right to work! This cuts break-in time, makes compound last longer.

Binderized Ruff-L-Buffs run cooler, too. Besides being pre-lubricated, there's a system of patented air channels built into the center rim, providing forced air circulation over all cloth surfaces.

H-VW-M Ruff-L-Buffs are also available without Binderized impregnation.

***All* H-VW-M Ruff-L-Buffs feature**

- **Bias-cut cloth** to prevent unravelling
- **Perfect buff balance** for uniform rotation and wear
- **Exclusive Red-E-To-Use face** that takes compound without surface preparation

Ruff-L-Buffs are available in a variety of outside diameters, center diameters and ply thicknesses.

UNTREATED BUFF SHOWS DAMAGE after being worn down 1" in testing and trimming. Loose threads, broken material, and many small holes were produced by abrasion and shock.

BINDERIZED RUFF-L-BUFF took this same tough test — and came through undamaged. See the difference? There's no thread or cloth breakage of any kind. That's proof of how Binderizing makes buffs last up to 30% longer.

*patent pending

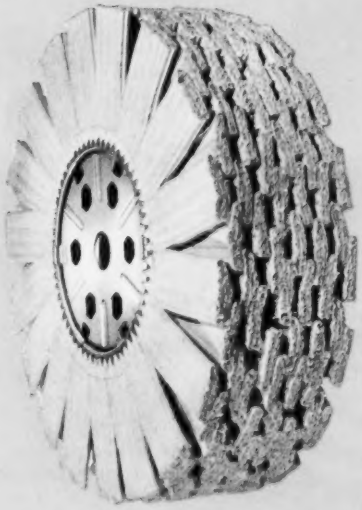
For CONTOUR WORK HARD METALS (HEAVY CUT)

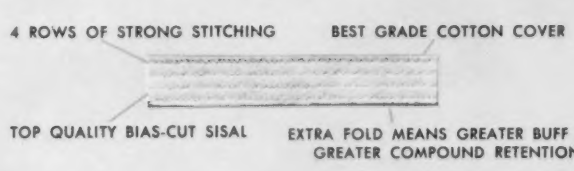
SISAL-FLEX®

Flexible, strong and long-wearing, Sisal-Flex buffs are best for fast, heavy-duty cutting on hard metal with contoured surfaces. Construction is overlapped for cool running, no streaking, unusual flexibility. Each individual buffing pad has an *extra* fold — to carry more compound on the leading edge for faster cutting with minimum buff wear. Other Sisal-Flex features include:

- **Ventilated steel centers**
- **Frayproof, scratchproof construction,** using best grade bias-cut sisal and cotton cloth
- **Four rows of stitching** for extra strength, longer wear

Sisal-Flex buffs are also available with triple-sewn buffing pads. Both types come in standard sizes from 12" to 18" in diameter.

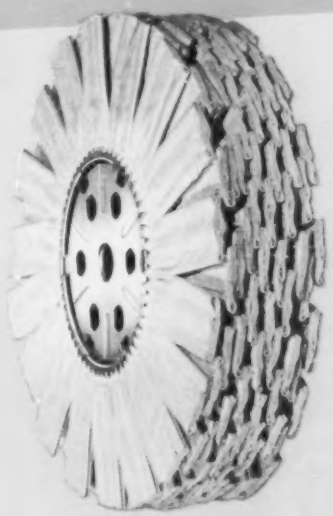




Here's a complete line of high-quality buffs . . . specially engineered by H-VW-M to give top performance and finest results in every step of your finishing operations.

Why? Because you need each of the four basic buff types shown here to get real efficiency on the *whole range* of jobs that pass through your buffing rooms. That's why H-VW-M engineers developed these "*Job-Tailored*" buffs. Each is designed—and *built*—for long-lasting *specialized* service. With H-VW-M "*Job-Tailored*" buffs, you're always ready to do the hard job, the special job, the quality job—better, faster and more economically.

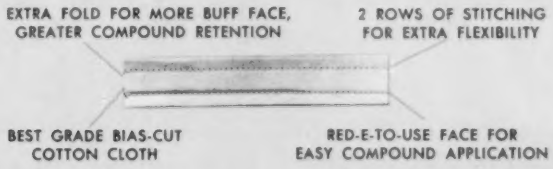
For CONTOUR WORK
LIGHT, FAST CUT
TUFTA-FLEX®



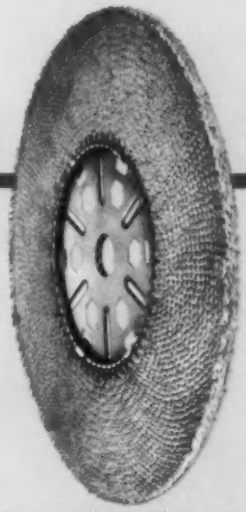
This strong, super-flexible buff gives excellent results on contoured surfaces where final finish must be smooth. Overlapped Tufta-Flex design assures cool running, firm, positive cutting with no streaking. Look for these special Tufta-Flex features:

- **Extra-strong construction** – all buff pads made of rugged 86/93 cotton, bias cut to prevent fraying
- **Double fold** – gives more cutting area, holds extra compound for faster work.
- **Two rows of stitching** for extra strength and flexibility
- **Ventilated steel center** with strong clamping teeth for safety

Tufta-Flex buffs are available in standard sizes from 12" to 18" in diameter.



For SEVERE OPERATIONS
DRAWN, STAMPED OR CAST METALS
BIAS SISALWEEV SECTIONS®



Tough and extremely adaptable, these H-VW-M Sisalweev Sections can bring new standards of efficiency and quality to a broad range of polishing and buffing operations. Each section is made of oil-impregnated sisal cloth, tightly woven and heavily compressed. The rugged sisal cloth is cut on the bias. Every strand of sisal fibre is anchored and angled for maximum cutting power at the contact edge. This insures even wear, too. That's one reason why H-VW-M Bias Sisalweev Sections outlast any others for heavy-duty cutting and polishing jobs on ferrous and non-ferrous metals.

Each section has its own sturdy steel center.

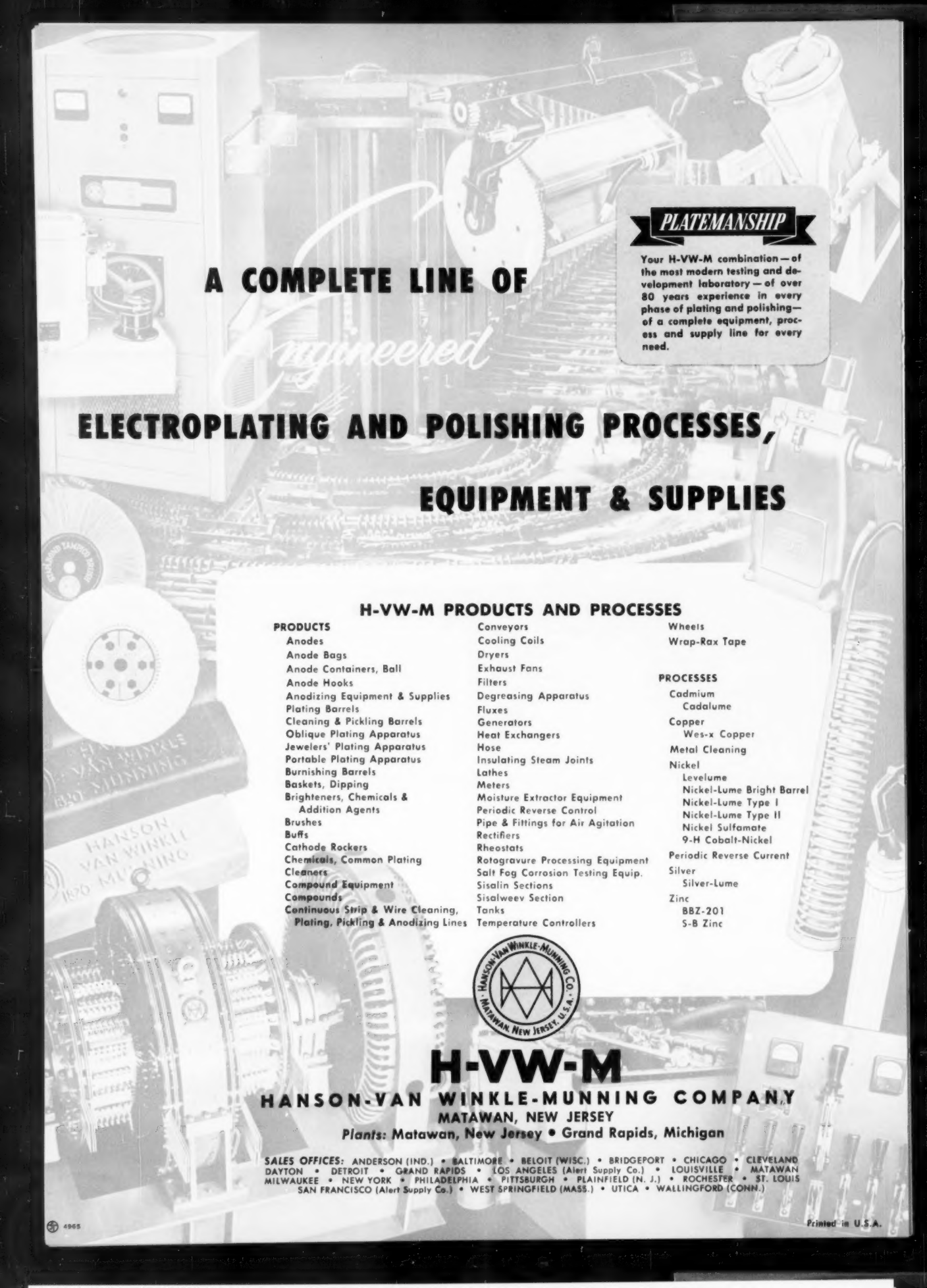
Bias Sisalweev Sections are available in 12", 14", 16" and 18" outside diameter sizes. Centers are available 5" or 7" in diameter.

FOR PRICES AND OTHER INFORMATION write Hanson-Van Winkle-Munning Company, Matawan, New Jersey.

WHY "Job-Tailored" BUFFS?

There's no such thing as an "all-purpose" buff. Like any tool, every buff is designed to perform its own range of functions. With the *right* buff on the job, production goes faster, quality goes up – and costs come down. Makes sense, doesn't it?

That's why so many economy-minded finishers are buying buffs to match the jobs. You'll find it pays to specify "*Job-Tailored*" buffs, designed and made by H-VW-M – experts in finishing processes and supplies for more than 70 years.



PLATEMANSHIP

Your H-VW-M combination — of the most modern testing and development laboratory — of over 80 years experience in every phase of plating and polishing — of a complete equipment, process and supply line for every need.

A COMPLETE LINE OF *Engineered*

ELECTROPLATING AND POLISHING PROCESSES, EQUIPMENT & SUPPLIES

H-VW-M PRODUCTS AND PROCESSES

PRODUCTS

- Anodes
- Anode Bags
- Anode Containers, Ball
- Anode Hooks
- Anodizing Equipment & Supplies
- Plating Barrels
- Cleaning & Pickling Barrels
- Oblique Plating Apparatus
- Jewelers' Plating Apparatus
- Portable Plating Apparatus
- Burnishing Barrels
- Baskets, Dipping
- Brighteners, Chemicals & Addition Agents
- Brushes
- Buffs
- Cathode Rockers
- Chemicals, Common Plating
- Cleaners
- Compound Equipment
- Compounds
- Continuous Strip & Wire Cleaning, Plating, Pickling & Anodizing Lines
- Conveyors
- Cooling Coils
- Dryers
- Exhaust Fans
- Filters
- Degreasing Apparatus
- Fluxes
- Generators
- Heat Exchangers
- Hose
- Insulating Steam Joints
- Lathes
- Meters
- Moisture Extractor Equipment
- Periodic Reverse Control
- Pipe & Fittings for Air Agitation
- Rectifiers
- Rheostats
- Rotogravure Processing Equipment
- Salt Fog Corrosion Testing Equip.
- Sisalin Sections
- Sisalweev Section
- Tanks
- Temperature Controllers
- Wheels
- Wrap-Rax Tape

PROCESSES

- Cadmium
  - Cadalume
- Copper
  - Wes-x Copper
- Metal Cleaning
- Nickel
  - Levelume
  - Nickel-Lume Bright Barrel
  - Nickel-Lume Type I
  - Nickel-Lume Type II
  - Nickel Sulfamate
  - 9-H Cobalt-Nickel
- Periodic Reverse Current
- Silver
  - Silver-Lume
- Zinc
  - BBZ-201
  - S-B Zinc

HANSON-VAN WINKLE-MUNNING CO. MATAWAN, NEW JERSEY, U.S.A.

H-VW-M

HANSON-VAN WINKLE-MUNNING COMPANY

MATAWAN, NEW JERSEY

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4965

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New H_2O_2 Shell Chemical Plant now on stream At Norco, Louisiana

With a multi-million pound capacity, this new Shell Chemical plant now takes its place as an important source of high-purity hydrogen peroxide.

Deliveries are now being made from Norco in drum to tank-car quantities.

To help you with your H_2O_2 application and handling problems, Shell Chemical maintains a very active research program and a field service to render expert technical assistance to processors. As a major consumer of hydrogen peroxide, Shell has acquired extensive experience in the special problems of H_2O_2 chemistry.

Your Shell Chemical representative will be glad to consult with you on your own H_2O_2 requirements.

Write to:

SHELL CHEMICAL CORPORATION

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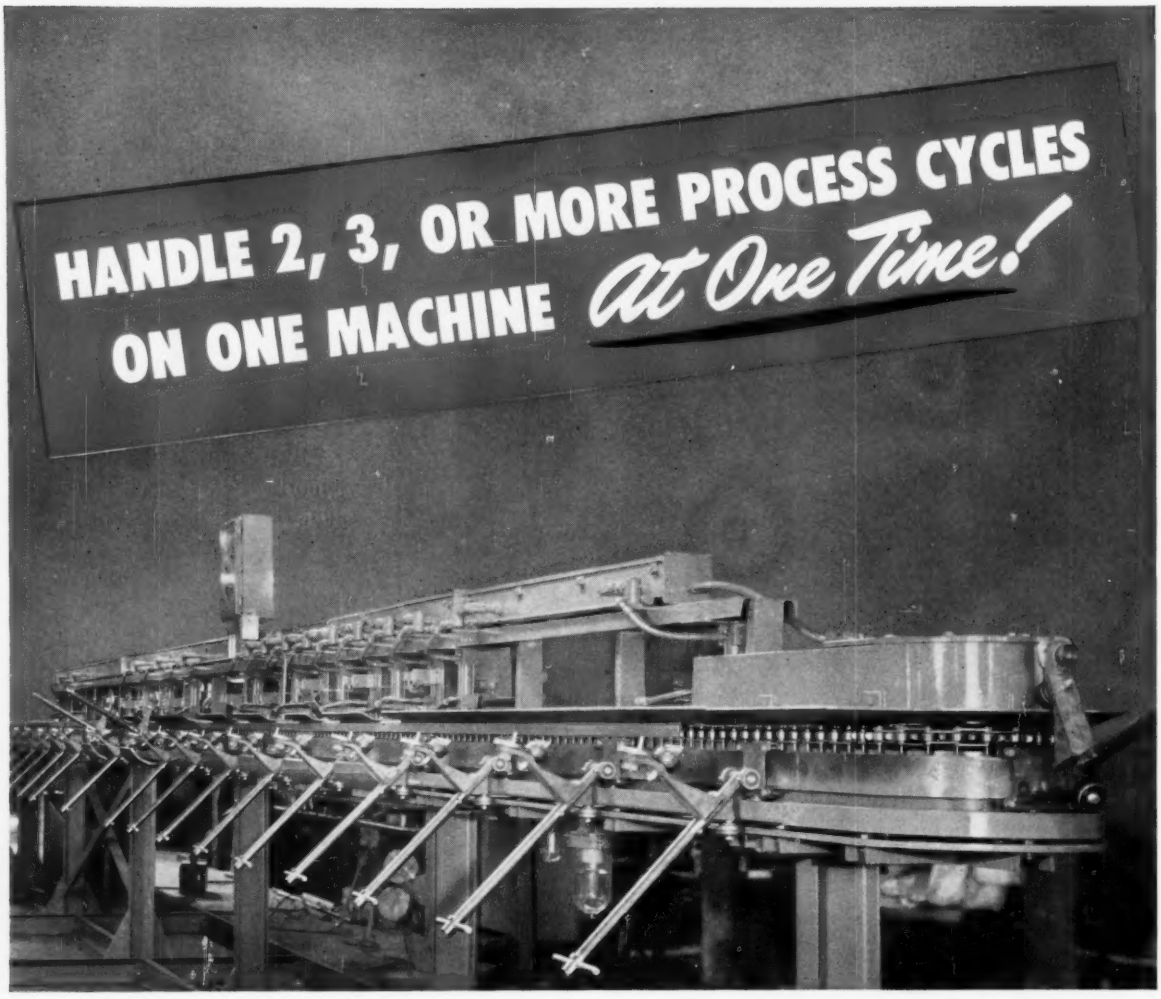

LASALCO'S *Select-O-Matic*

MULTIPLE PROCESS PLATER

Another Lasalco development that offers the industry the last word in *fully automatic* plating!

With the new Select-O-Matic, the operator simply selects the desired process cycle for individual racks, when loading the machine, merely by turning a dial on the carrier. From that point, the rack *automatically* travels through the entire selected cycle without further attention.

A single Select-O-Matic plater, manned by one operator, will handle several various processes simultaneously. Different machines for each process are eliminated—original investment in equipment is greatly reduced—much less floor space is needed—maintenance is cut to an absolute minimum.

The Select-O-Matic is easily adaptable to any operation. Tell Lasalco about *your* operation and requirements to learn what this new machine can do for *your* production and profits.

Write Today!

LASALCO, INC.

HOME OFFICE: 2820 LaSalle St. • St. Louis 4, Mo. • PRospect 1-2990
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Get the results you want from Wyandotte's Barrel-Finishing Compounds

BURNEK 22—Minimum running time gives exceptionally brilliant luster to brass, copper, nickel, silver and gold. Low cost, uniform results.

ALTREX®—For quick cleaning, cut-down, de-burring of steel, aluminum, brass, die castings. An economical, all-purpose de-burring compound.

BURNEK 452—Nonfoaming, free-rinsing combination cleaner-burnisher for steel, stainless steel; quickly develops high luster.

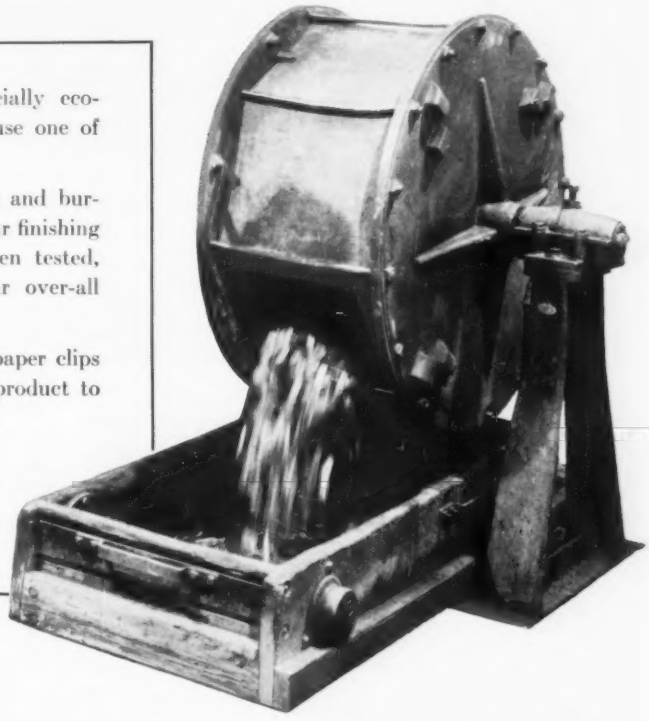
BURNISHING COMPOUND 321—Non-toxic brightening agent easily removes light tarnish; excellent for zinc, brass, copper, bronze, steel, stainless steel, gold.

A.E.—Powdered acid compound for brightening steel, stainless steel, brass, copper. Removes scale, rust, tarnish, spot-weld marks, flux from brazing operations.

BARREL FINISHING can be an especially economical way of finishing parts when you use one of Wyandotte's barrel-finishing compounds.

You see, Wyandotte produces de-burring and burnishing compounds to cover all phases of your finishing operations. Each of these products has been tested, proven in operation; each will lower your over-all costs through low use-costs.

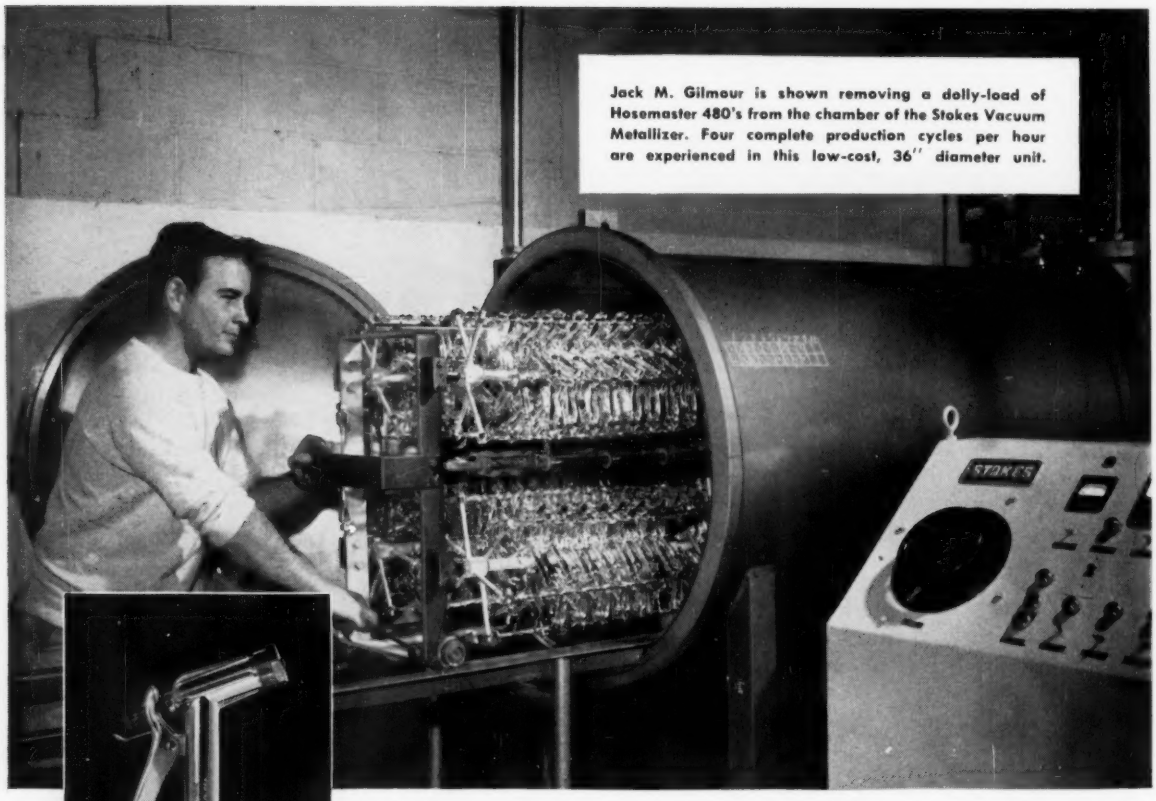
Whatever your finishing problem—from paper clips to zinc die castings—there's a Wyandotte product to solve it—efficiently, economically. Why not call your Wyandotte representative today. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*



Wyandotte CHEMICALS

J. B. FORD DIVISION

The best in chemical products for metal finishing



Jack M. Gilmour is shown removing a dolly-load of Hosemaster 480's from the chamber of the Stokes Vacuum Metallizer. Four complete production cycles per hour are experienced in this low-cost, 36" diameter unit.

Gilmour Hosemasters given lasting finish in Stokes Vacuum Plating Chamber

Gilmour Manufacturing Co., Somerset, Pennsylvania, is the world's largest maker of pistol-grip hose nozzles—the Hosemaster line. Their Model 480, for example, is leak-proof and clog-proof, with a tooled all-brass valve arrangement . . . has a lifetime metallic finish on the body, put there in a Stokes Vacuum Plating Chamber.

Vacuum metallizing can give a distinctive gold, brass, copper or chrome finish at a cost considerably lower than electroplating . . . making it possible to offer smart, modern tools at low, competitive prices. It also enables plating of non-conductive materials . . . and bright lasting finishes that must withstand weather and other abusive environments.

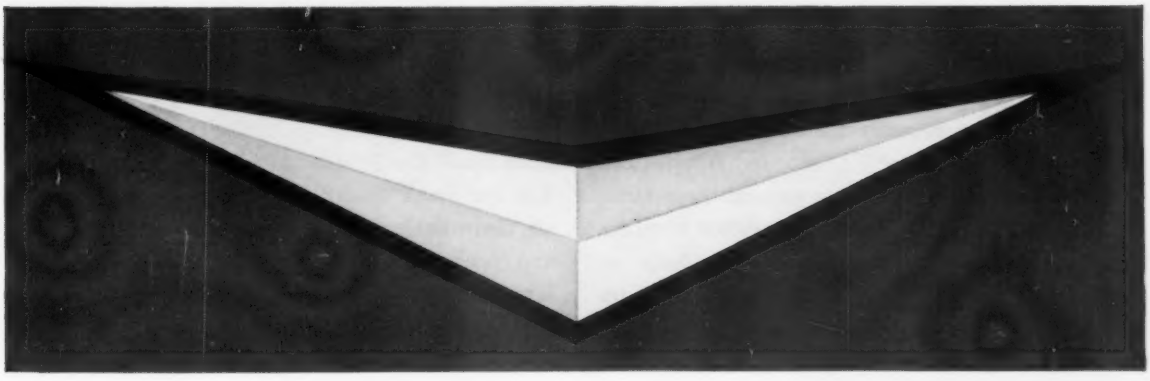
Interlocked centralized controls on the Stokes systems make it easy for employees to learn operating procedures and routine—and to produce consistently high standards with minimum labor. The equipment, itself, is compact and self-contained . . . requires little floor space.

Investigate this modern, low-cost method for finishing metals or plastics. Stokes can give you practical help in over-all planning . . . to determine plant layout as well as production techniques, rates and costs . . . to select materials and auxiliary equipment . . . to train your operators. Contact your nearest Stokes office, or write for additional data on Stokes Vacuum Metallizing equipment.

Vacuum Equipment Division
F. J. STOKES CORPORATION
5500 Tabor Road, Philadelphia 20, Pa.

STOKES

NOW... light-fast, uniform-colored Aluminum!



PFIZER OXALATES can help you achieve sales advantages in the fast-growing field of colored aluminum.

Oxalates permit you to produce superior gold colored aluminum. Coloring is accomplished by precipitating iron oxide in the aluminum oxide coating from solutions containing ferric oxalate or ferric ammonium oxalate. Shades, from yellow to brown, can be obtained readily by varying the processing technique.

Why not investigate the big profit potential in producing better colored aluminum through the use of PFIZER OXALATES. Write for further technical information on Pfizer Oxalates.

Related to this field is Aluminum Company of America Patent No. 2,290,364, and possibly others.

Manufacturing Chemists for over 100 Years

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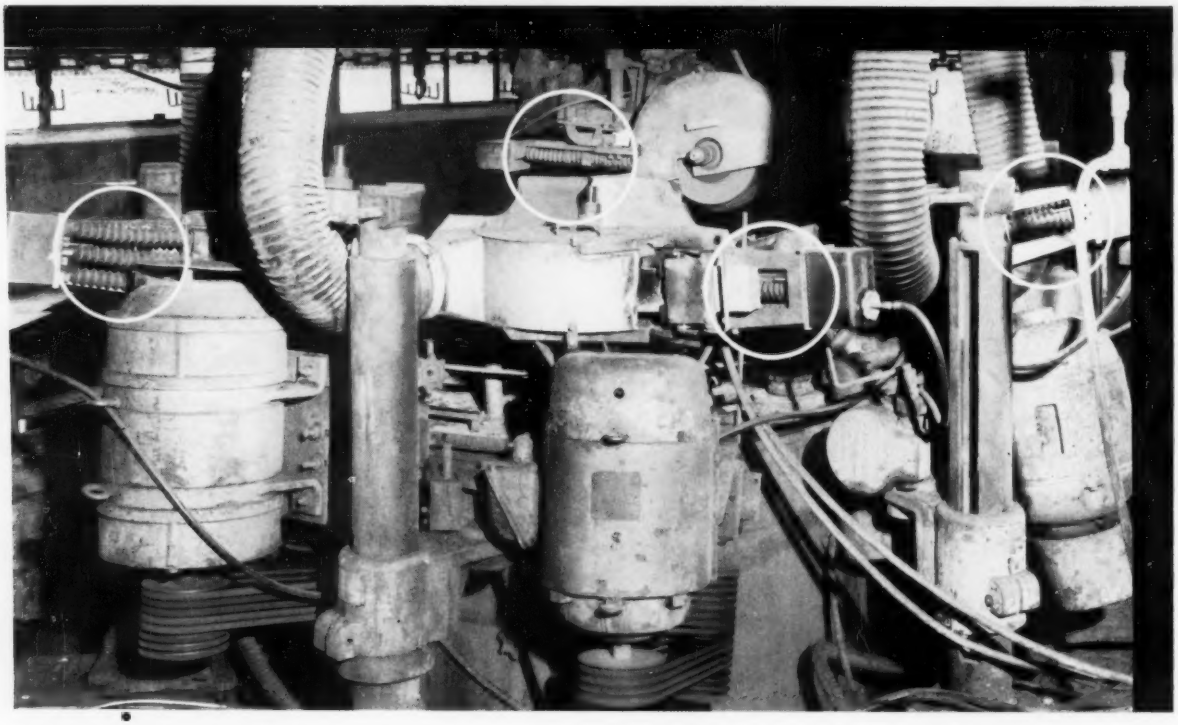


How Trim Manufacturer Cut Compound Costs in Half . . .

A prominent Detroit automotive manufacturer recently installed several Nankervis Automatic Compound Applicators for a trial period on one of their automatic trim buffing lines. After running an extensive series of tests — both on quality and quantity — they came up with these amazing results:

	SPRAY	BAR
COMPOUND USED	105 pounds	107 pounds
COMPOUND COST	$183.74 (.17½ x 105)	$176.55 (.16½ x 107)
NO. OF PIECES BUFFED	12,600	32,000
COST PER PIECE	$.0145 each	$.0055 each

Bar compound, automatically applied, doubled the number of pieces that could be buffed with the same amount of compound, cutting costs in half! Too good to be true? Conditions too ideal? Maybe. But the proof lies in the fact that now all their automatics use bar compound and Nankervis Applicators — saving dollars every minute of operation.

Sound interesting?

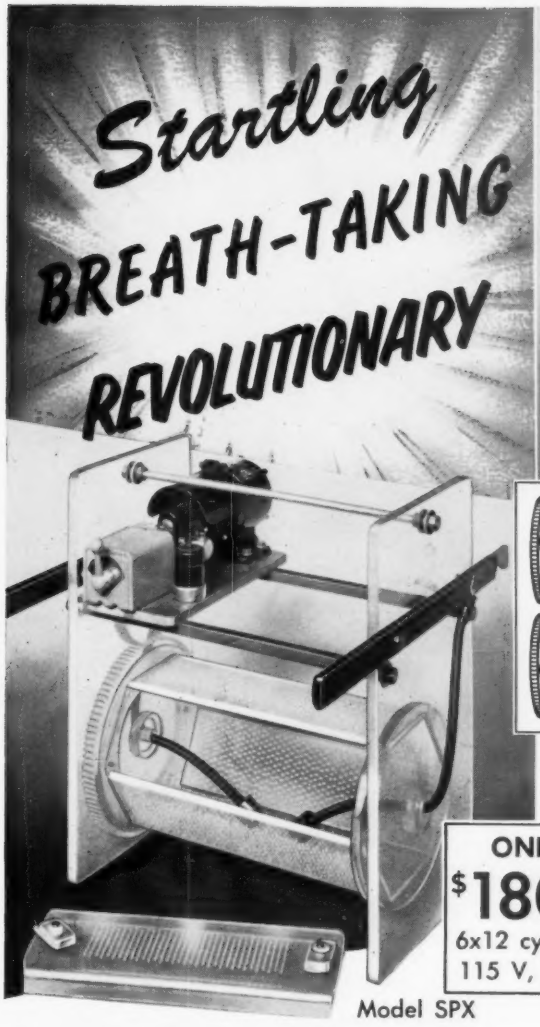
If it does, then why don't you too arrange for a trial in your plant. It won't cost you a cent. You conduct the test and you be the judge.

Write today for information about a trial in your plant. *George L. Nankervis Company, 15300 Fullerton Avenue, Detroit 27, Michigan.*

GEORGE L. NANKERVIS COMPANY

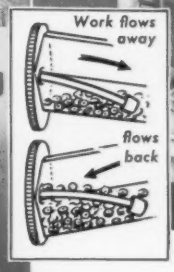
Equipment and Supplies for the Metal Finishing Industry

Startling BREATH-TAKING REVOLUTIONARY



ONLY
$180.00
6x12 cylinder
115 V, 60 C

Model SPX



Pat. App. SN-510,922. Model SPXO

BELKE Double Oscillating Cylinder

Affords uniformity of deposit never before obtainable in barrel plating.

Eccentrically mounted cylinder oscillates as it rotates. Moves the work back and forth *across* the cylinder. No parts remain shielded by cylinder ends. All parts exposed for plating so uniform you can deposit specified thickness in a fraction of the time formerly required.

An absolute must for washers and flat pieces that tend to stick together.

All sizes from 14 x 30 regulars to 6 x 12 portables.

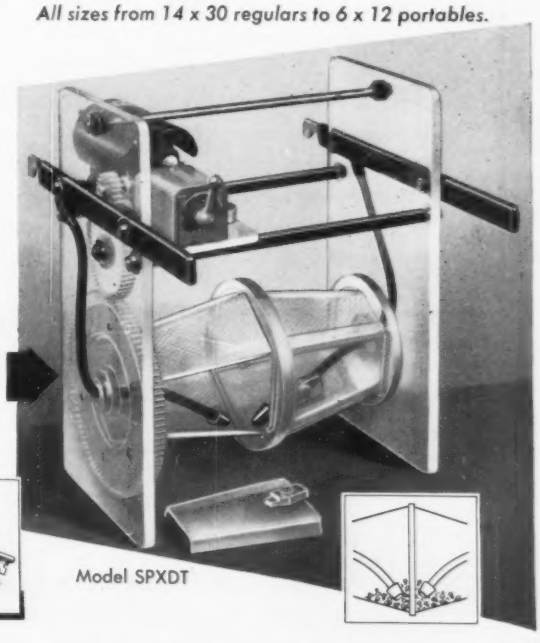
Conventional Non-oscillating Cylinder

Features of all three Porto-Platers shown

- "V" notch contact; fits any place on cathode rod.
- Self-contained motor drive with reversing switch.
- Obstruction free cylinder.
- Attached Plexiglas cover locks—never misplaced.
- One-piece dangler cable with ball contact.
- High temperature Plexiglas cylinder, cover, hangers, gears and bushings.
- Geared head motor, 1/50 HP. 115 V. 60 C, 1 Ph.

BELKE Double Tapered Odd-Lot Plater

Two *tapered* compartments. The taper piles the work around the ball contact in each compartment. Assures uniform plating in each compartment of any quantity from a few pieces to a full load. Avoids costly hand wiring otherwise necessary in plating small quantities.



Model SPXDT

BELKE MANUFACTURING COMPANY
947 Cicero Ave., Chicago 51, Ill.

TRADE MARK

EVERYTHING FOR PLATING PLANTS

NEW SHAPED, EXTRUDED APW SILVER ANODES

STANDARD SHAPES

CONTROLLED GRAIN SIZE: APW EXTRUSION PROCESS* controls grain size within definite limits — minimizes sheddings

These scientifically shaped anodes retain 80% of original active surface area after 85% by weight has been plated off!

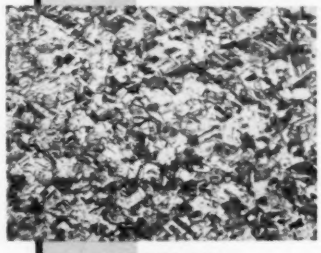
Costs are lowered by prolonged anode life, minimized polarization and less silver scrap to be refined.

In addition, the APW Extrusion Process controls grain size within definite ideal limits so that corrosion is smooth and uniform. Electrodeposits are *consistently* smooth. Shedding is virtually eliminated. Rejects are a comparative rarity!

We are anxious that the silver you buy in anodes is used most efficiently and economically. Special anode shapes will be engineered to meet your particular plating bath conditions. Call or write for a representative. We'll be glad to assist with your plating problems.

*Pat. Pending

ROLLED FLAT PLATE ANODE SECTION:
This Photomicrograph shows highly irregular, uncontrolled grain size—a major cause of shedding and resultant rough electrodeposits.



APW EXTRUDED ANODE SECTION:
Small, fully controlled regularity of grain size promotes uniform corrosion, smoothest electrodeposits, less rejects.

ENGELHARD INDUSTRIES, INC.

AMERICAN PLATINUM & SILVER DIVISION

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Here's why saran lined pipe cuts installation costs

It's easy to fabricate, easy to install at job site . . .
and it resists corrosion for years

Here is a corrosion-resistant pipe that can be fabricated in the field. Saran lined pipe can be cut and threaded at the job site with conventional hand tools or power equipment. And, once installed, saran lined piping systems resist corrosion for years . . . offering proved long-range economy.

For piping acids, alkalies, solvents and other corrosive fluids specify saran lined pipe, fittings, valves, and pumps with the new gray lining. This new lining anchored under pressure within the steel casing, enables you to pipe fluids over a wider range of temperatures than ever before . . . with maximum protection from corrosion, plus the strength of steel.

Saran lined pipe, fittings, valves, and pumps are available for systems operating from vacuum to 300 psi, and from well below zero to 200°F.

If your operation can benefit from a *complete* corrosion resistant piping system, write today for more information about saran lined piping components. And be sure to ask about Saraloy® 898 tank lining, too! THE DOW CHEMICAL COMPANY, Midland, Michigan.

SARAN LINED PIPE COMPANY
DEPT. 2001D
2415 BURDETTE AVENUE
FERNDALE 20, MICHIGAN

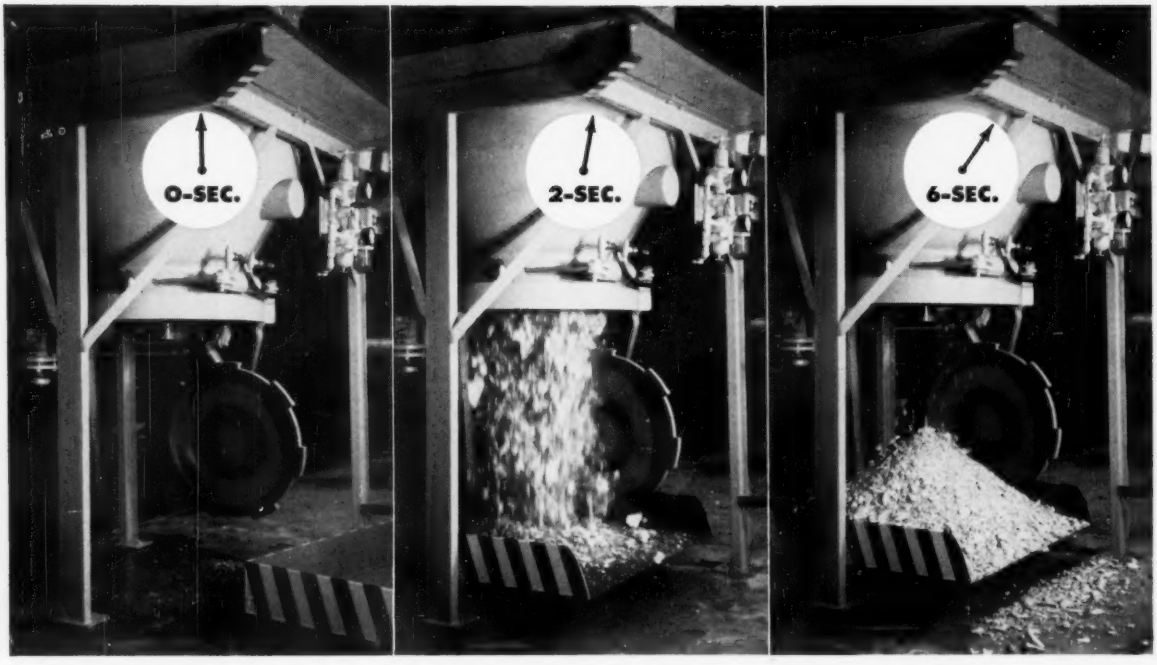
Please send me information on: ☐ Saran lined pipe, fittings and valves. ☐ Saran lined centrifugal pumps. ☐ Saraloy 898 chemical resistant sheeting.

Name_____ Title_____ Company_____

Address_____ City_____ State_____

YOU CAN DEPEND ON DOW

Here's what MODERN FILTERS can do!



Just flip the lid . . . WHAM . . . cake removed in seconds

It's just as easy as that . . . why put up with costly downtime and messy cleaning operations when Industrial has the answer to **rapid thorough cleaning in seconds.** Industrial's new Vertical, Bottom Outlet, Type "152" Filter offers tremendous advantages in removing and subsequent disposing of waste materials.

Industrial's quick opening bottom drop door is the **fastest available method for removing large volumes of solids in a dry form or slurry,** depending on the customer's wishes. Shaken loose by a vibrator, the solids literally explode from the leaves, fall into a tote box ready for simple disposal. The cake can be leached before removal from the filter to recover valuable metal salts. **This is especially important in reducing costs** not only in the plating room but helps cut the cost of preparing end waste for safe disposal.

NEW! 16 page manual describes modern filtration methods for plating . . . ask for Bulletin EP-100

INDUSTRIAL

INDUSTRIAL FILTER & PUMP MFG. CO.
5906 **OGDEN AVENUE** • **CHICAGO 50, ILLINOIS**

28/Circle on Readers' Service Card

MOTOROLA'S PRECISION PLATING

Demands A WAGNER PRECISION AUTOMATIC

Motorola's Plant Manager Roy Gould to Wagner Vice Pres. John E. Hunt: "We plate a variety of electronic components to close tolerances. The Wagner Automatic gives us the control we need."

Television and other electronic components are cadmium plated to specifications much more rigid than most military parts. That's why Motorola, Inc., after an intensive study of all makes of automatic plating machines in the plants of its suppliers and many other manufacturers, specified a Wagner Automatic for their critical work, a deposit of .0003″ +.000075″ —0″. This precision plating machine, designed to solve Motorola's problems but using many standard components, now produces 95% of the requirements of the Communication and Industrial Electronics Division, proof of the versatility of Wagner design and engineering.

Plant Manager Roy Gould says, "Only the Wagner Automatic offers all the features desired, in addition to the greatest output per hour of the quality plating we demand. We like the smoothness of lift and transfer, the absence of impact, the elimination of a tremendous superstructure, and the foolproof hydraulic system. The simplicity of design and the standardization of parts and assemblies enable our mechanics to handle all adjustments and maintenance. The installation was fast—and the Wagner men performed their company's contractual and unspoken obligations competently and without hesitation. Since the first week or two of running, only minor adjustments have been needed."

Remember, only Wagner manufactures the equipment and processes the chemicals required by your plant. For information on Wagner automatic plating machines and materials handling engineering services, write today or call our representative in your area.

MANUFACTURERS AND PROCESSORS OF ALL METAL-FINISHING CHEMICALS, ANODES, AND EQUIPMENT

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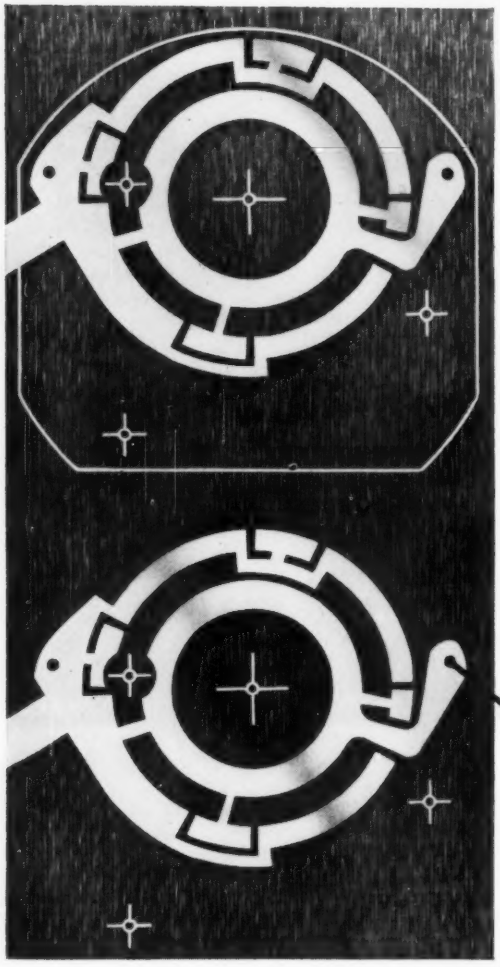
Wagner BROTHERS INC.

Now you can plate THROUGH holes in printed circuits with NEW CuSOL PROCESS



Photomicrographic cross-section of printed circuit shows how the CuSOL process permits plating through holes in core stock.

Plating *through* holes in printed circuits is only one big feature of Seymour's new CuSOL* process. Besides the exceptional throwing power which makes this new, exclusive Seymour process ideal for plating of printed circuits CuSOL has other features which make it unique and useful to copper plating.

CuSOL may be added directly to either Copper Sulphate or Copper Fluoborate baths.

CuSOL permits smoother, more ductile deposits of *any thickness* than is possible with molasses, bone glue or dextrin baths.

CuSOL eliminates "treeing" and nodular build-up.

CuSOL deposits are easy to buff.

CuSOL copper plate is hard (75 on Rockwell F scale).

CuSOL permits use of wide current density range and increases plating speeds from 50% to 200%.

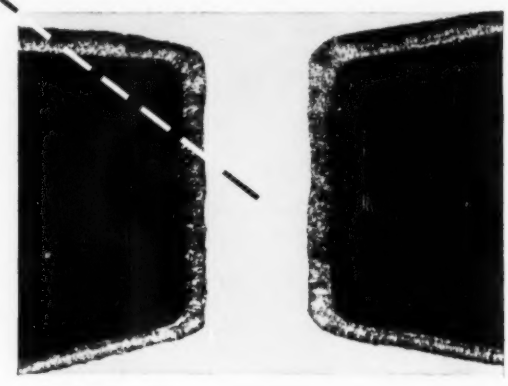
CuSOL is inexpensive to use and economical to maintain.

* Patent Applied For

COMPARISON OF PHYSICAL PROPERTIES
CuSOL vs DEXTRIN TYPE BATHS

	CuSOL	DEXTRIN
Tensile Strength	41,000 psi	33,000 psi
Elongation in 2 in.	23%	16%
Rockwell "F" Scale	75	66
Ductility	4 bends on itself	2 bends on itself

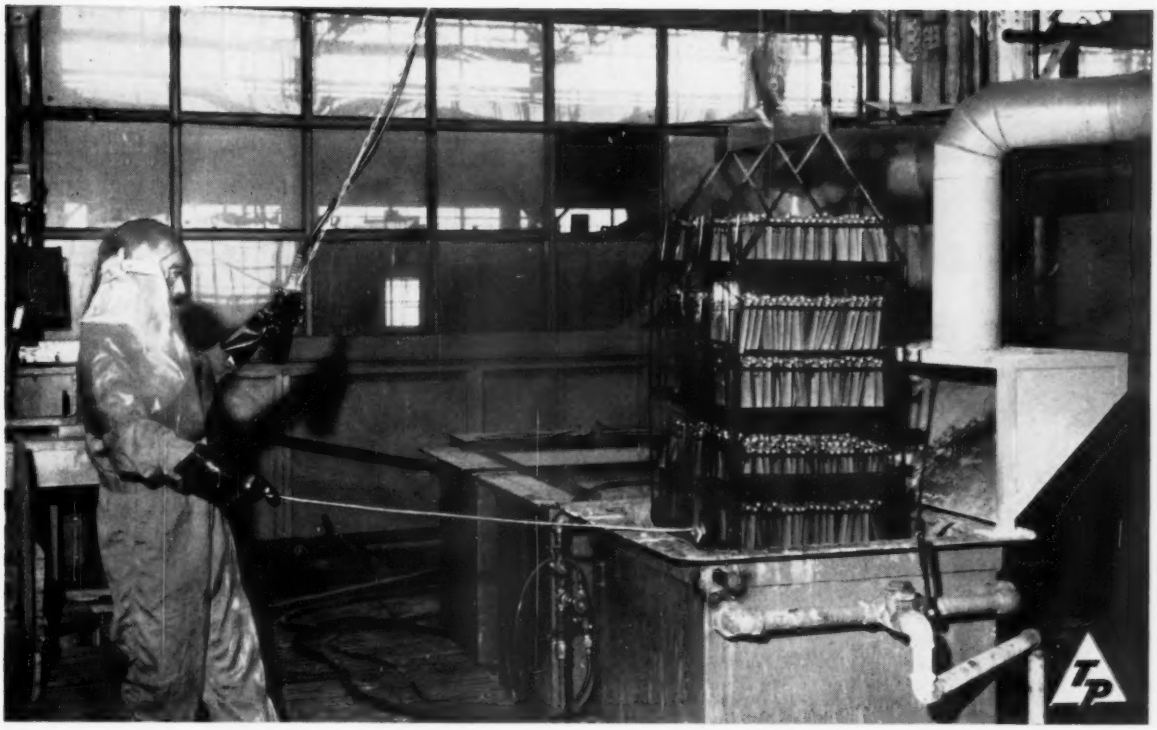
(Thickness of copper specimens tested was 0.033")



Write for detailed information

THE SEYMOUR MANUFACTURING CO.

4 FRANKLIN ST., SEYMOUR, CONNECTICUT



How Thompson Products saves $9,750 a month descaling titanium parts in hot Virgo bath

In this plant of Thompson Products, Inc., titanium forgings become mirror-smooth blades for aircraft turbines. But first, workers must get rid of the tough black oxide scale that forms on the parts during forging and heat treating.

They used to *blast* scale loose with a special zirconium sand imported from half-way around the world. But the sand was expensive—$10,000 a month. It had to be purchased and stored 4½ carloads at a time. Stacked in bags, it ate up valuable space—and made a mess when heavy bags burst.

Then this company called in a Hooker sales-service man who showed how they could get the scale off *chemically*. He recommended Virgo Descaling Salt at a cost of only *$250 per month* instead of $10,000 for sand.

Parts come clean in 4 dips

Now titanium parts ride in stainless-steel baskets through four dip tanks—and come out with not a trace of scale. In five minutes in the first tank, molten Virgo salt at 850°F removes almost all of the stubborn scale. In successive dips, cold water removes the adhering molten salt, acid quickly removes the residual soft oxide and hot water rinses the parts clean.

The process descales stainless steel and other high-temperature alloys, too—simply by raising temperature of the salt another 100 degrees. There's no attack on the metal itself at any stage.

It's easier now for inspectors to see tiny defects in the smooth, chemically clean surface of these parts; so quality control is better than before.

Maintenance costs are lower, too: just four dip tanks that need occasional replenishing with salt and acid.

Have you a tough scale problem? Perhaps a talk with a Hooker representative will open a way to substantial cost reductions for you. If you'd like to discover how, just drop us a note on your business letterhead.

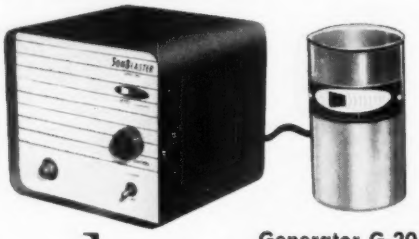
HOOKER ELECTROCHEMICAL COMPANY
1302 Union Street, Niagara Falls, N. Y.

HOOKER CHEMICALS PLASTICS

DUREZ® PLASTICS DIVISION • NORTH TONAWANDA, N.Y.
NIALK® CHEMICALS • NIAGARA FALLS, N. Y.
OLDBURY® CHEMICALS • NIAGARA FALLS, N. Y.

Sales Offices: Chicago, Ill.; Detroit, Mich.; Los Angeles, Calif.; New York, N. Y.; Niagara Falls, N. Y.; Philadelphia, Pa.; Tacoma, Wash.; N. Tonawanda, N. Y.; Worcester, Mass. *In Canada:* Hooker Chemicals Limited, N. Vancouver, B. C.

NEW! *The lowest-cost ultrasonic cleaning and chemical processing unit available anywhere!*



Generator G-201,
Tank NT-201

narda

SONBLASTERS $175

Now, no one need put off buying an ultrasonic cleaning or chemical processing unit because of cost! Narda's mass production techniques have done it again—this time, a top-quality 35-watt unit, complete with stainless steel transducerized tank with tremendous activity, at the lowest price in the industry—and with a full 2-year warranty besides!

What do you want to clean? Hot lab apparatus, medical instruments, electronic components, optical and technical glassware, timing mechanisms —the Narda SonBlaster cleans 'most any mechanical, electrical or horological part or assembly you can think of — and cleans faster, better and cheaper. It's perfect, too, for brightening, polishing, decontaminating, sterilizing, pickling, deburring, and plating; emulsifying, mixing, impregnating, degassing, and other chemical process applications.

What's more, two tank sizes are available, and there's a duty cycle timer at only $10 additional. Couple all these advantages with the low, low price, and you'll see why you can't beat the Narda Series 200 SonBlaster (as well as the larger models) for top value. Mail the coupon now for free help in determining the precise model best for you.

SPECIFICATIONS

Generator Model No.	Tank Model No.	Interior tank size (in.)	Tank Capacity	Price
G-201	NT-201	4-5/8 deep x 3-5/16 diam.	1/8 gal.	$175
G-201	NT-202	6-1/2 deep x 4-7/8 diam.	3/8 gal.	$210
Model G-202 Generator (same as G-201, but with duty cycle timer) available with either tank above, $10 additional.				

The SonBlaster catalog line of ultrasonic cleaning equipment ranges from 35 watts to 2.5 Kw, and includes transducerized tanks as well as immersible transducers which can be adapted to any size or shape tank you may now be using. If ultrasonics can be applied to help improve your process, Narda will recommend the finest, most dependable equipment available — and at the lowest price in the industry!

The Narda Ultrasonics Corporation
118-160 Herricks Road
Mineola, L. I., New York
Dept. MF-3

Gentlemen:

Please send me more information about
- ☐ The complete Narda line
- ☐ Series 200 SonBlasters

Name_____
Organization_____
Address_____
City_____ Zone____ State_____

the narda ultrasonics corporation
118-160 HERRICKS ROAD, MINEOLA, L. I., N. Y.
Subsidiary of The Narda Microwave Corporation

34/Circle on Readers' Service Card

IOLYTE

LAMINATED FIBERGLASS FOR CORROSION RESISTANCE

IOLYTE

TANKS

Fabricated to your Specifications

NO MOLDS NEEDED — Made any size, any shape, at no extra cost and no loss of delivery time.

UNIFORM DIMENSIONS — NO TAPERING — Dimensions are same at bottom and top . . . means larger capacities than tapered molded tanks.

FLANGES, DAMS, Etc. — Can be inexpensively equipped with flanged connection, holes, overflow dams, baffles, separations, etc.

CHEMICALLY RESISTANT THROUGHOUT — Fabricated from ***iolyte*** sheet properly reinforced. This is a structural material . . . not a lining.

Write for literature, prices, and table of chemical resistance for Iolyte tanks, crocks, ducts.

IOLYTE

CROCKS

Available from Stock

PRICE LIST

Gal. Cap.	Outs. Diam.	Outs. Hght.	List Cost
5	9"	18"	18.00
5	10"	15"	18.00
8	12"	16"	22.00
10	12"	20"	24.00
12	12"	24"	26.00
9	10"	24"	23.00
7	9"	24"	21.00
10	16"	12"	26.00
12	16"	14"	28.00
15	16"	18"	33.00
20	16"	24"	40.00
30	16"	36"	49.00
40	16"	48"	59.00
14	18"	12"	35.00
20	18"	18"	40.00
26	18"	24"	45.00
30	18"	28"	49.00
40	18"	36"	59.00
50	18"	48"	69.00
27	22"	18"	49.00
30	22"	20"	53.00
55	22"	36"	70.00
73	22"	48"	83.00
55	28"	22"	76.00
95	28"	36"	98.00
125	28"	48"	125.00

IOLYTE

DUCTS

ANY DIMENSIONS ANY CURVES ANY LENGTHS

iolyte has greater resistance to chemical attack than stainless, Monel, or aluminum. 1/5 the weight of steel, it is superior in tension, flexural, and compression strength. Unlike thermoplastics ***iolyte*** will not heat-distort below 350 deg.

Send drawings or prints for quotes and ask for literature giving chemical resistances.

Order from us or your distributor. Unless rated firm, payment with order. No COD's.

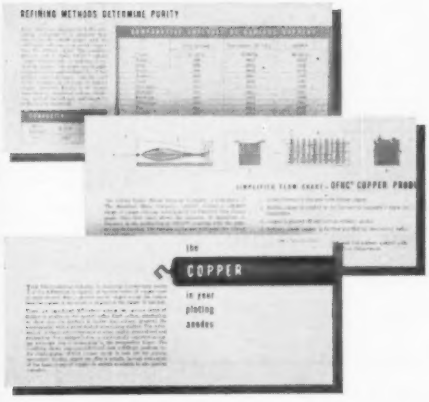
ALL PRICES F.O.B. FACTORY

SCHORI PROCESS DIVISION
FERRO-CO CORPORATION
8-11 43rd ROAD, LONG ISLAND CITY 1, N. Y.
FACTORY: 59-31 54th STREET, MASPETH, L. I.

35/Circle on Readers' Service Card

you need the facts about

the COPPER in your plating anodes...



NEW!

Illustrated technical report available for the asking!

Here's a problem that perplexes many copper electroplaters:

Which anode is best for my plating operation?

Latest booklet in the OFHC® Plating Publications Series can help you decide. Fact-packed, "The Copper in Your Plating Anodes" (Pub. CA-15) explains the relationship between copper purity and plating results. We are sure you'll find it useful.

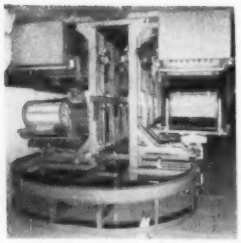
Ask today for your free copy! Just contact your OFHC Copper Anode distributor or any of our sales offices directly.

AMERICAN METAL CLIMAX, INC.

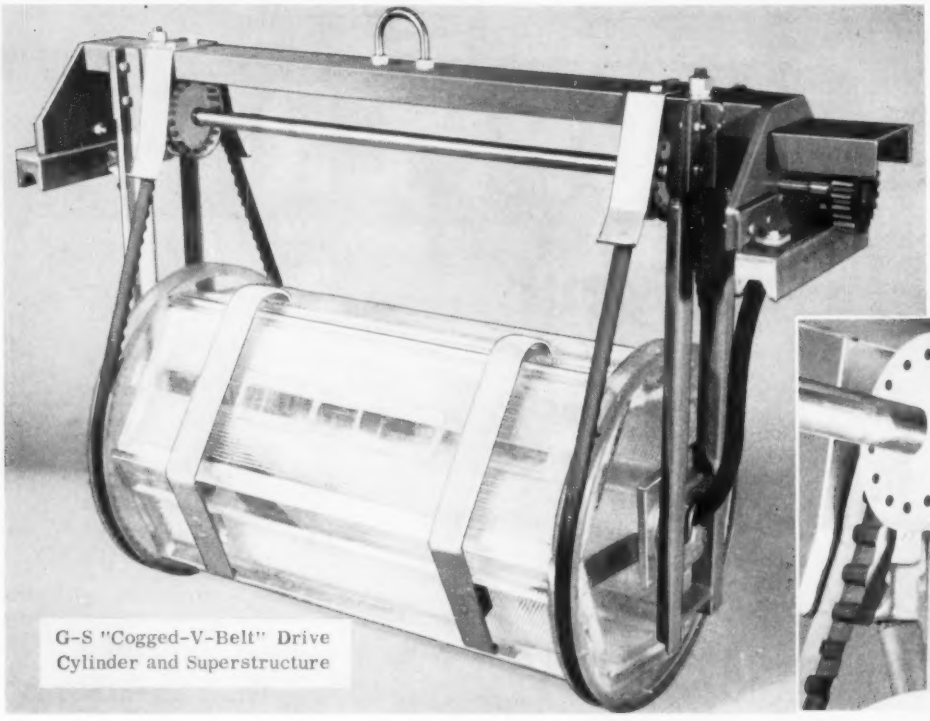
61 Broadway, New York 6, New York

BOSTON — **DETROIT** *(The American Metal Co. Ltd. of Mich.)* — **CHICAGO** — **LOS ANGELES** *(The American Metal Co., Ltd. of Cal.)*

OFHC® Copper Anodes are made only by American Metal Climax, Inc.

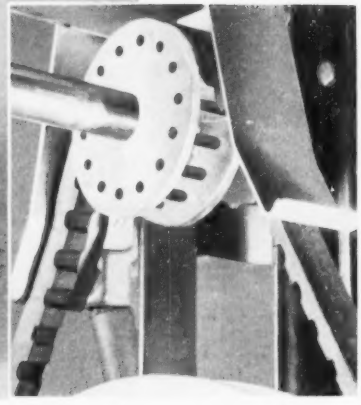


THE MOST ADVANCED PROCESS AUTOMATION SELECTS... G-S PLATING BARRELS



G-S "Cogged-V-Belt" Drive Cylinder and Superstructure

"Cogged-V-Belt" Drive



G-S Means Greater Savings: Saves 100% Gear Maintenance. Eliminates: cylinder-end drive gear, idler gear, pinion gear, 3 bearings. No gears or bearings in solution.

Now is the time to trim operation costs! G-S equipped platers say, ". . . we cut costs to 66% . . . shortened plating time 80% . . . practically no maintenance . . ." Perfected, Proved, Patented (U. S. Pat. 2,562,084), G-S "Cogged-V-Belt" Drive, Full-Cycle Plating Barrels out-perform and out-produce all others in hundreds of plants. Better, faster plating for production runs (manual or automatic) and stop-and-go job-type operations alike. Sets the pace in the industry for *exclusive features* (see right). Investigate the new, low-cost G-S Conversion Plan for *your* plant. *It pays for itself in maintenance savings alone.* Write today.

The G. S. Equipment Co.

15583 Brookpark Rd., Cleveland 10, Ohio

CLearwater 2-4770

Exclusive Features:

★ **"The Belt-Drive with the Gear Grip"**— Exclusive G-S cogged V-belt and cogged drive-pulley, constant meshed for positive power transmission without gears. Can't slip, creep, vary speed. Cogged-V-Belts steel tensile members won't stretch.

★ **Floating End Plates** for constant contact of inverted V-blocks. Can't rock in saddles. More contact.

★ **Automatic Positioning** — Guide channel directs superstructure into operating position quicker, easier.

★ **Adjustable Bearings** support drive shaft — maintain constant-mesh with motor drives at all times.

★ **Floating Hubs** with danglers angled downward for constant cathodic contact in center of load. Won't "ride" up on top of load.

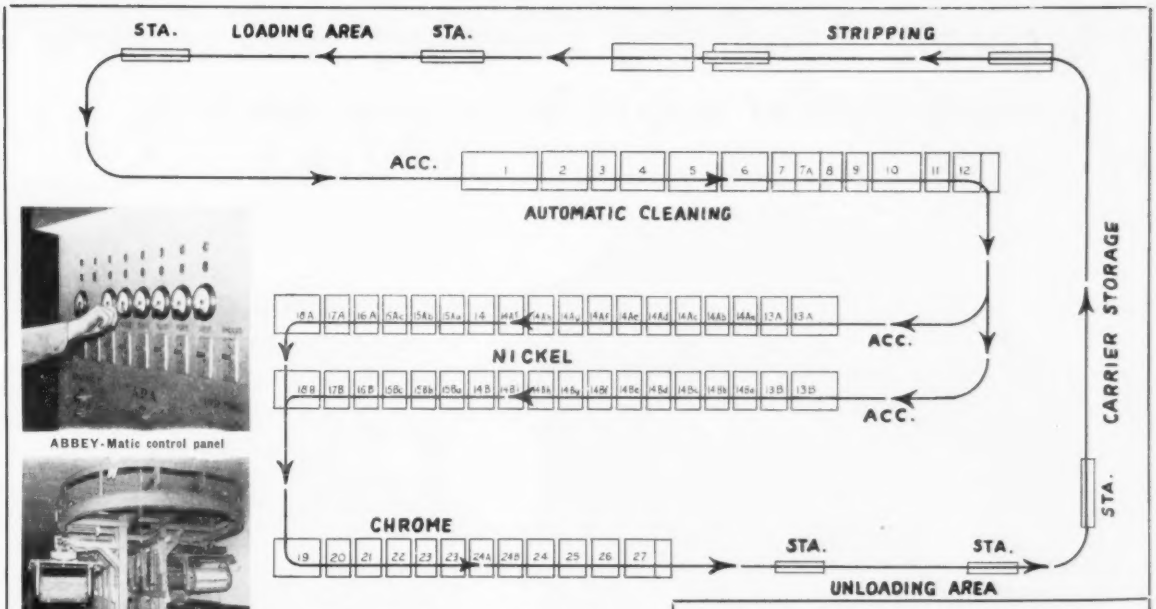
★ **Heavier Dangler Cables** for higher current carrying capacity, longer life, better operation.

★ **Faster Dangler Cleaning** — Slide out hub-lock: 10 secs. Interchange cyls: 5 mins. Cuts hours off usual time.

★ **Total Cylinder Immersion** — Prevents gas pockets. Increases current density. Eliminates danger of explosions. Bigger loads, faster plating.

★ **Rugged, All-Welded Cylinders** — "H-T Sincolite" or "Tempron" Hard Rubber. Heavy-duty, 2" ribs. No "formed" or "molded" sections. Longer life. Best for complete cycles, temps. to 200°F.

★ **Many More Features** — 16" more Contact area. Up to 30% greater current flow per load. Also available with horn-type contacts (3-point suspension with 4-point contacts. No shorts from burned-out insulation and arcing). Single-Screw Adjustable Motor Mount. Ask for full information NOW!



ABBEY-Matic control panel

ABBEY-Matic process sections

There are substitute track segments and individual station elevators at all process tanks, loading and unloading areas.

KEY TO PROCESS CYCLE SHOWN ABOVE

1.	Soak Clean	14A.	Drain & Transfer
2.	Cathodic Clean	15Aa.-15Ac.	Bright Nickel
3.	Cold Rinse & Spray	16A.	Recovery Rinse
4.	Anodic Acid	17A.	Rinse & Spray
5.	Cold Rinse & Spray	18A.	Hot Rinse
6.	Anodic Clean	19.	Load & Soak Clean
7.	Cold Rinse & Spray	20.	Cathodic Clean
7A.	Drain & Transfer	21.	Rinse & Spray
8.	Acid Dip	22.	Acid Dip
9.	Cold Rinse & Spray	23.	Rinse & Spray
10.	Nickel Strike	23.	Drain & Transfer
11.	Rinse	24A.-24B.	Chrome Plate
12.	Acid Rinse	25.	Recovery Rinse
13A.	Acid Rinse	26.	Rinse & Spray
13A.	Drain & Transfer	27.	Hot Rinse
14Aa.-14i.	Nickel Semi Bright		

HOW ABBEY-MATIC DOES IT!

Follow the "Arrows" to Bigger Profits with ABBEY-Matic, First to "Break the Barriers" of Synchronization and Fixed Sequence in Process Automation

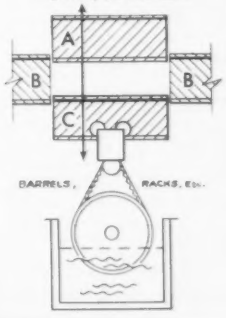
The flow pattern in the above diagram is making process automation history! It's the first of its type—spearheading a new era of streamlined production for multi-cycle processing. Here is a layout, so simple and direct it might appear as routing for an army of skilled operators and mono-rail hoists. Instead, it's an ABBEY-Matic system — with *no* operators, *no* hoists. Automatic processing in its most simplified, yet most efficient form.

Automation without limitation or complication. One continuous feeding monorail travels from loading area to accumulate and feed carriers at front end of ABBEY-Matic Cleaning Section; then feeds through another accumulation section at head of two ABBEY-Matic Nickel Plating Sections (or a single elongated section, optional). Workloads then proceed through ABBEY-Matic Chrome Plating cycle, continuing to the unloading area. There, the free-wheeled carriers travel on around through stripping cycle and finally into loading area to repeat the operation. It's continuous, fast, fail-proof, completely automatic. No confusion, no delays.

Found: The "Missing Link" to Flexible, Multi-Cycle Selection. Carriers function as robots, independent of each other, automatically "leap-frogging" occupied stations, "by-passing" wrong stations, "entering" right stations — by remote control. This is an exclusive feature of ABBEY-Matic's principle (Pats. Pending) of "missing link" substitute track segments replacing main track segments which are lowered by individual station elevators with carriers to process tanks (see diag. at rt.) Free-way is thus maintained on main track regardless of carriers in process stations. In multiple cell high production set-ups, carriers are permitted to enter only one cell of an identical process station, and will automatically by-pass the others in any order.

Accumulation, Feed, and Load. Integrated conveying of carriers eliminates need of synchronizing at front and rear ends of ABBEY-Matic process sections. All monorails used are *part* of the ABBEY-Matic system of continuous, uninterrupted flow. No need for manually assisted "synchronizing" at any point. Individual station elevators at loading and unloading areas enable operators to feed constant stream of loaded or unloaded carriers without regard for synchronization, or need for working with carriers in motion.

As bottom track-segment "C" lowers carrier to tank, "missing link" track-segment "A" drops into place, closing gap in track "B". Other carriers travel over units in process, all-automatic.



ABBEY-Matic Cuts Costs—does the job with less equipment; eliminates skilled manhours. Movements and timing are predetermined, and actuated by simple, fail-proof electro-mechanical devices. Carriers can be selected and transferred at random for any station. Processing time for different loads is allotted individually, can be varied station-to-station by separate timer controls. Only ABBEY-Matic *non-synchronized* carrier and station impulse-memory signaling and control make *full automation* possible. Learn how ABBEY-Matic can bring *full automation* to *your* plant. Ask about ABBEY-Matic Medium-Duty Rack Machine.

For complete information, write today.

ABBEY PROCESS AUTOMATION INC.

37-01 48th Ave., Long Island City 1, N. Y.

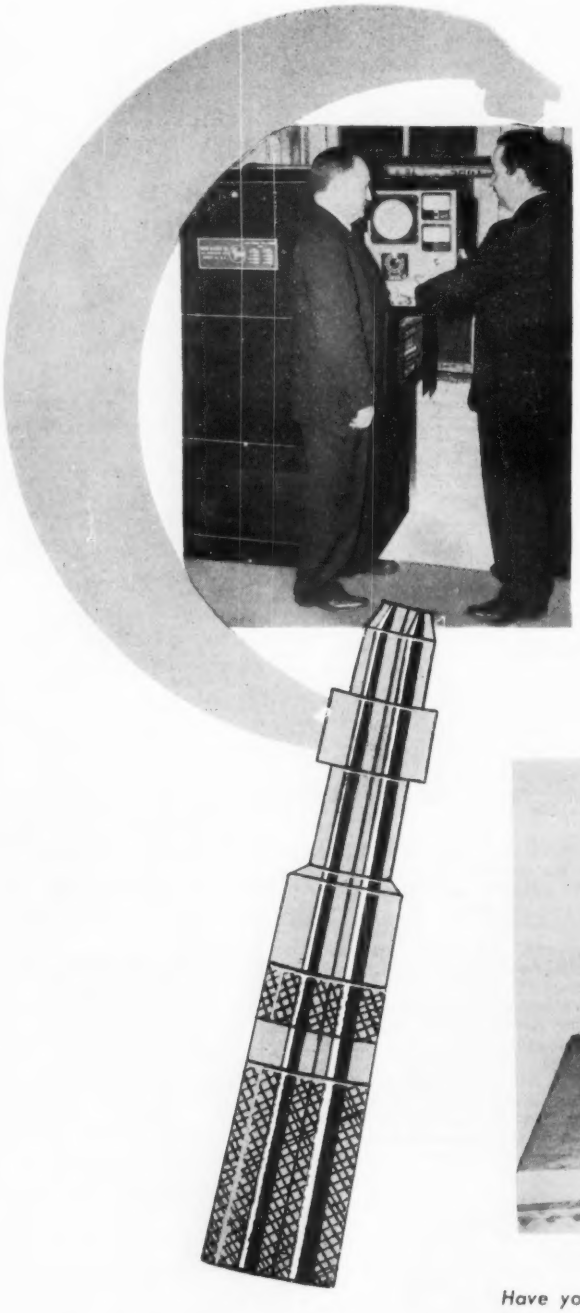
RAvenswood 9-0592

Midwest Representative: The G. S. Equipment Co. 15585 Brookpark Road, Cleveland 11, Ohio

Canada Representative: Armalite Co. Ltd. Crystal Arts Sq., Toronto 6, Can.

Accurate Anodizing Company relies on RAPID

automatic rectifier control for precision anodizing . . .



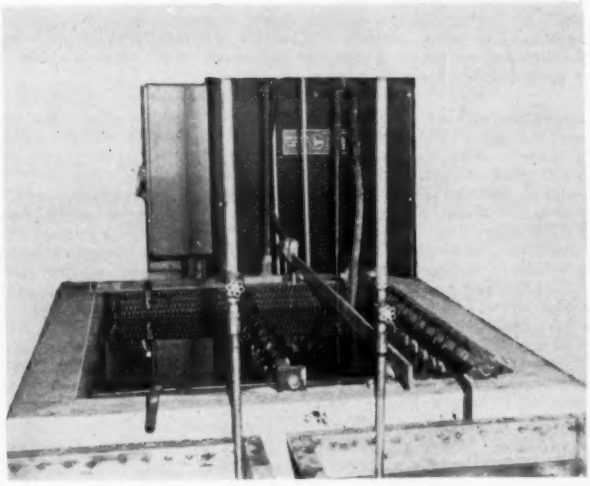
ACCURATE ANODIZING COMPANY of Chicago, Illinois, is a specialist in *Hard Coat Anodizing.

Maintaining a standard of quality indicative of its name is a constant challenge.

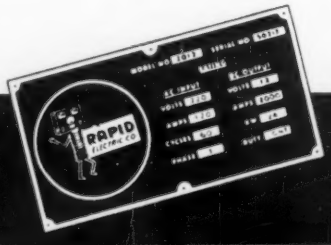
When special rectifying equipment was required to meet extremely critical specifications and close tolerances, A. A.'s staff consulted RAPID engineering specialists.

Recommendations of automatic voltage stabilization and step programming were acted upon. Result: Accurate thicknesses – held to close tolerances – accomplished automatically.

* Patented Process.



Have you a special power requirement?
Professional consultation service available without obligation.
Why not call us to-day?



THE NAMEPLATE THAT MEANS *"More Power to You!"*

RAPID ELECTRIC COMPANY

12838 Fenkell Avenue • Detroit 27, Mich. • Diamond 1-8537
2881 Middletown Road • New York 61, N. Y. • TAlmadge 8-2200

Satin ELEGANCE in Modern Furniture Hardware

by *Bassick-Sack*

BASSICK-SACK, a division of Stewart-Warner Corporation, is one of the country's largest manufacturers of fine furniture hardware . . . and much of this hardware is Lea Satin Finished.

Bassick-Sack says, "In the finishing of all of these parts we use various Lea Compounds, particularly in our buffing and polishing processes, and we are pleased to state that these compounds afford us the fine lustre and quality finishes that are demanded by our customers and the consuming public."

So, for your consumer products, why not try a LEA Satin Finish. Here is a modern finish, a quality finish, a durable finish, a low cost finish . . . a finish that both sales and manufacturing will go for. Write us today for further information on LEA SATIN FINISH.

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing and polishing compounds for over 30 years.

The Hallmark of Quality Products

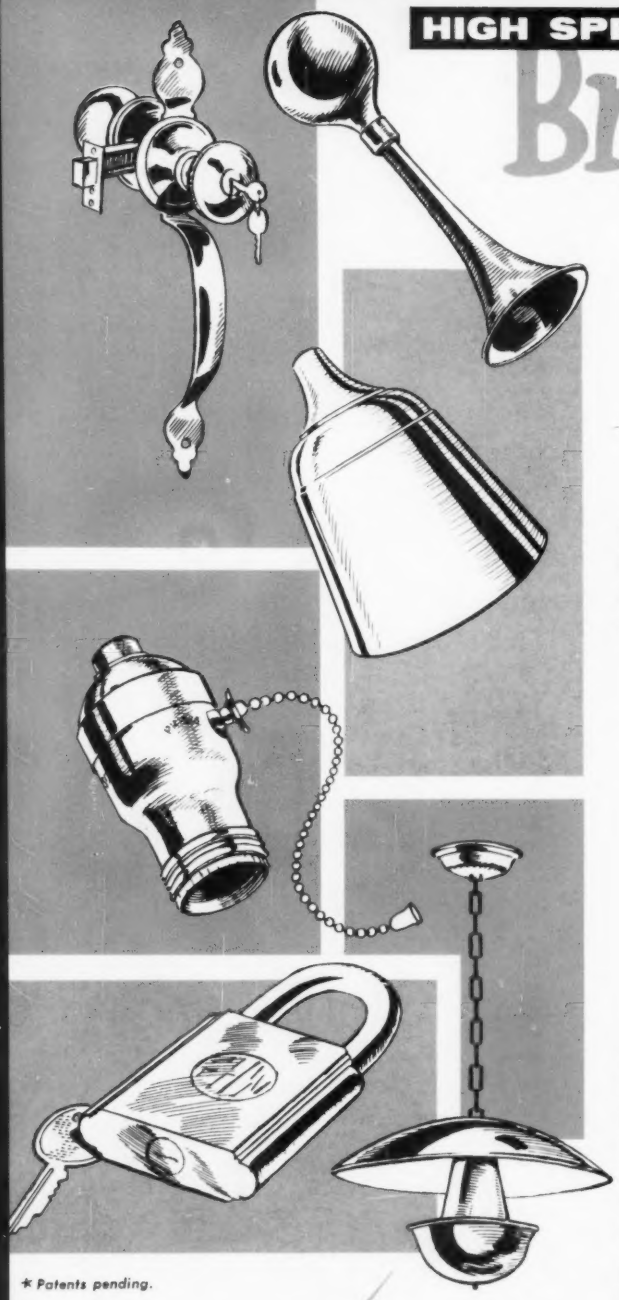
THE LEA MANUFACTURING CO.
16 CHERRY AVE., WATERBURY 20, CONN.

Lea-Michigan, Inc., 14066 Stansbury Ave., Detroit 27, Mich.
Lea Mfg. Company of Canada, Ltd., 1236 Birchmount Road, Scarborough, Ontario, Canada
Lea Mfg. Company of England, Ltd., Buxton, England
Lea-Ronal, Inc., Main Office and Laboratory: 139-20 109th Ave., Jamaica 35, N. Y.
Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

Are you interested in plating specialties? See the other side of this insert

HIGH SPEED

Brass Plating



The Lea-Ronal Brass-Glo* process provides:

- ✓ High rate of deposition
- ✓ Simple operation — constant color

The inherent values of the Lea-Ronal Brass-Glo process have been completely substantiated by results of several years of full production use in numerous plants. Here are some of these values in addition to the two noted above:

- ***Uniformly lustrous deposits over wide current density range (5-100 amperes/ sq. ft. Hull Cell, depending upon agitation rate).***
- ***High cathode efficiency (90% or better).***
- ***Soft, ductile deposits; easily buffed or flowed, if desired.***
- ***Increased production without increasing volume of solution, number of tanks or other expensive equipment.***

By using the Lea-Ronal Brass-Glo process, existing tanks can be made to produce more and better finished pieces. For the new plant, or for an expansion program, less floor space and less capital expenditure will be required to 'set up'.

Just ask any user of this Lea-Ronal Brass-Glo Process or ask to have one of our representatives demonstrate its values in your plant on your products. Most existing solutions can be readily converted.

Our experienced Technical Service is available for any plating problem. Lea-Ronal Plating Formulations and Additives cover practically all plating operations.

** Patents pending.*

The LEA GROUP
serving the Finishing Field

Lea-Ronal, Inc., Jamaica, N. Y.
Lea-Michigan, Inc., Detroit
The Lea Mfg. Co., Waterbury, Conn.
Lea Mfg. Co., of Canada, Ltd.
Lea Mfg. Co., of England, Ltd.

Plating Polishing Buffing Burring

Lea-Ronal *Inc.*

Sales and Manufacturing Plant:
237 East Aurora Street, Waterbury 20, Conn.
Main Office and Laboratory:
139-20 109th Avenue, Jamaica 35, N. Y.

Are you interested in Buffing, Polishing and Burring Specialties? **SEE OTHER SIDE OF THIS INSERT.**

℞ TREAT ALUMINUM RIGHT with these proven AHCO Compounds

℞ Lustralume No. 1

This outstanding new burnishing compound is a clear stable liquid readily soluble in water. It's non-toxic, non-flammable, mildly alkaline, and moderate foaming. Ideal for use in all conventional types of oblique or horizontal barrels where moderate foaming is permissible. Solutions are free rinsing and leave no undesirable films on the work. Properly cleaned surfaces emerge with a smooth brilliant lustre.

℞ Ahcal Deoxidizer

This compound is ideal for removing smut after cleaning and etching, and before painting. Its convenient powdered form make it safer than liquid acids and it gives off no dangerous or toxic fumes.

℞ Ahcal Etch Cleaner No. 1

This powdered, concentrated, alkaline material produces an attractive, uniform etch in a very short time on all types of aluminum surfaces. It's non-dusty and its solutions produces the right amount of foam. The outstanding characteristic of Ahcal is its ability to dissolve large quantities of aluminum without forming undesirable scale or sludge. As a result maintenance problems are eliminated or alleviated.

℞ Ahcoloid Cleaners

No. 189—A non-etching alkaline soak cleaner for cleaning aluminum prior to anodizing and chemical processing.

No. LC-3—An emulsifiable liquid pre-cleaner . . . ideal for removal of oil, grease, and buffing residues from aluminum. It's non-corrosive and non-toxic.

No. 59-H-5—A non-etching alkaline cleaner for use in power washers. It's low foaming and has exceptional cleaning power.

LUSTREBRITE LIQUID 35—A new type of liquid soak cleaner developed specifically for removing buffing compound residues and fingerprints. It's an aqueous solution of non-toxic, non-corrosive, organic materials. It has no flash or fire point and it's non-fuming.

Write for Bulletins to

Hubbard Hall

APOTHECARIES HALL CO.

DIVISION OF

THE HUBBARD-HALL CHEMICAL CO.

WATERBURY, CONN.

Now...easy-to-use vinyl maintenance coating

...offers plating plants a long lasting "paint job"

ALL of the remarkable corrosion resistance of a vinyl-based coating can now be obtained without the meticulous surface preparation normally required for such coatings. This is especially good news for plating plants.

Development of Ucilon Coating 1400 simplifies application of a durable protective coating to walls, ceilings, floors, and the exterior of equipment. Unlike previous vinyls, it is self priming . . . goes over old paint without special preparation. It has a mild odor and the safety of a high flash point.

Applying and brushing out like oil paint, Ucilon 1400 resists acids, alkalies, water and other causes of early paint failure.

With this new coating, you can now economically maintain your plant in attractive condition and mark it as a good place to do business with and a better place to work in. Send for data sheet . . . or ask the Metal & Thermit man about it.

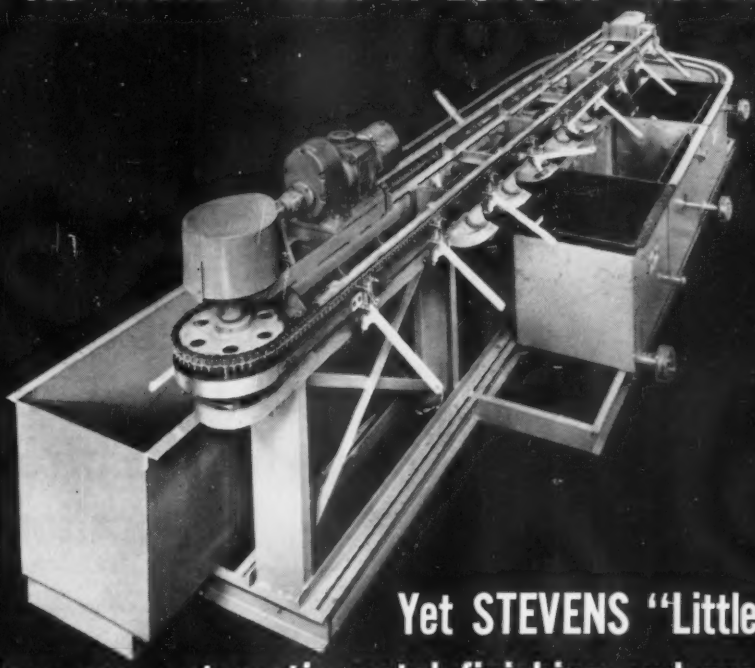
HEAVY DUTY PROTECTION: For interiors of tanks, ducts and other equipment exposed to exceptionally severe or continuous contact with corrosives, use a vinyl *plastisol* coating. Unichrome "Super 5300" Coating enables a coat *60 mils thick* or more to be *sprayed* on in a single coat. Write for Bulletin SVP-1 for details.

Unichrome is a trademark of Metal & Thermit Corp.

PLATING MATERIALS
ORGANIC COATINGS
TIN & TIN CHEMICALS
CERAMIC MATERIALS
WELDING SUPPLIES
METALS & ALLOYS
HEAVY MELTING SCRAP

METAL & THERMIT
CORPORATION
GENERAL OFFICES: RAHWAY, NEW JERSEY
Pittsburgh • Atlanta • Detroit • East Chicago • Los Angeles
In Canada: Metal & Thermit—United Chromium of Canada, Limited, Rexdale, Ont.

COSTS NO MORE THAN A LUXURY AUTOMOBILE...



Yet STEVENS "Little Steve" gives you *automatic* metal finishing and processing!

SAVES TIME—SAVES SPACE—SAVES MONEY!

Now you can afford automatic metal finishing and processing—and automatic control—without making a costly capital investment for equipment! "Little Steve" offers you high-volume capacity with minimum space requirements and installation costs. For the price of a luxury automobile, you can have all of the advantages of automatic plating or processing.

"Little Steve" also offers you savings in supplies and labor. It's accurate, reduces rejects, and improves quality! Its low initial cost makes it the ideal choice for any size plating or metal processing operation!

TALK ABOUT VERSATILITY!

Stevens "Little Steve" can be adapted to perform a great many metal finishing operations, including . . .

- ANODIZING (INCLUDING DYEING)
- DIP PAINTING
- FLO-COATING
- ELECTROTYPE (PRINTED CIRCUITS PLATING)
- PLASTIC COATINGS
- BRIGHT DIPPING
- PROPRIETARY TREATMENTS
- HOT TIN DIPPING
- ULTRASONIC CLEANING
- HARD CHROME PLATING
- ELECTROPOLISHING
- TIN IMMERSION PROCESSING
- COPPER IMMERSION PROCESSING

For more details about the "Little Steve" and what it can do for you, contact your local Stevens Sales Representative or write direct to: Frederic B. Stevens, Inc., 1800 Eighteenth Street, Detroit 6, Michigan

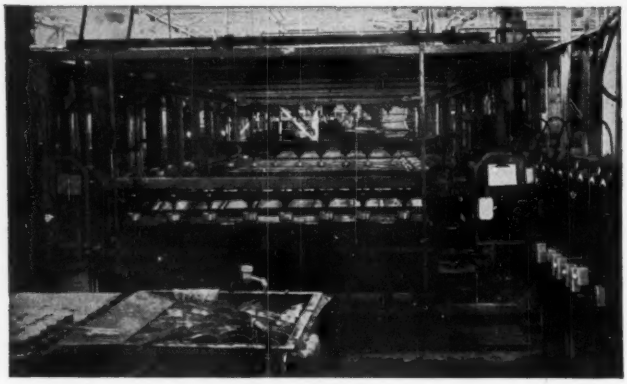
Remember—When you go automatic—go Stevens!

frederic b. **STEVENS,** inc.

DETROIT 16, MICH.

BUFFALO CHICAGO DETROIT CLEVELAND DAYTON NEW HAVEN SPRINGFIELD (OHIO)

New High Standards in Plating • Processing • Cleaning



U.S. Fully Automatic Equipment for processing and heavy copper plating the bottoms of popular brand stainless steel cooking utensils. 10 such U.S. installations are in service in 3 plants of this manufacturer.

EQUIPMENT US Since 1896

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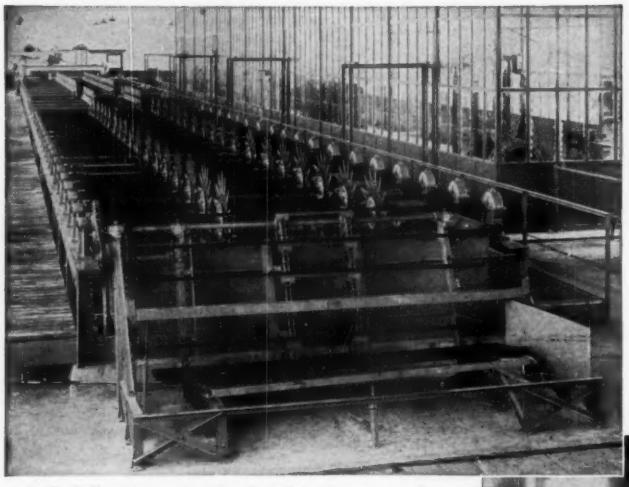

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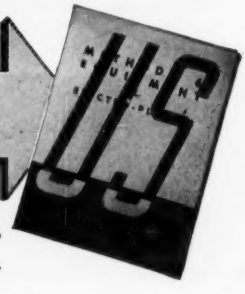

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MARCH, 1958 Volume 56 Number 3

FEATURES

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Metal Finishing

POLISHING AND BUFFING · BARREL FINISHING · CLEANING
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ESTABLISHED 1903 VOLUME 56 • NUMBER 3 • MARCH, 1958

Still Going Strong

By 1928 chromium plating, no longer a novelty, was beginning to come into wide use as a decorative and protective metal coating process, and cries were going up that there would be no more need for silver plating flatware and holloware, for what woman would consider silverplate when she could purchase an item which was non-tarnishing and required no polishing? A few years later, stainless steel was going to eliminate plating altogether and, still later, vacuum metalizing began to worry the metal finishers about their investments in unusable plating equipment. Yet, metal finishing by electrodeposition has continued to grow rather than to regress.

New processes always bite into the established ones, but this is more than balanced by new uses for the latter. There is quite a bit of stainless steel flatware on the market but, in all the years this has been available, silver plate has been increasing in volume because the beauty of a silver finish cannot be matched by stainless steel. When the lady of the house wants to make a good impression on her guests, is she going to put her crystal goblets back in the closet and set out the colored, anodized aluminum ones? On the other hand, we doubt whether the plating industry could ever convince papa that he should spend three times as much for a nickel plated toy gun when his pride and joy will be just as pleased with a vacuum metalized plastic one, and with much less serious consequences as a result of hitting papa's elbow or the furniture.

At present, when business conditions are not what they should be, to put it mildly, it is understandable that platers will remember with regret the articles they formerly plated, and which have been irrevocably taken over by competitive processes. They will wonder whether the loss could have been prevented by better quality polishing and plating and if, by emphasizing the advantages more forcefully, they would still be in possession of the sorely needed business. We do not believe it would have made much difference. Perhaps the switch could have been delayed for a while, but it was inevitable for — let's face it — in the long run, every process will stand or fall on its own merits.

The applications of the various finishes are rather well defined and, although a certain amount of overlapping is to be expected, there are fields in which plating, anodizing, vacuum metalizing, organic finishing, and solid metals are outstanding. We are optimistic about the future of plating but sometimes wonder whether just a little of the money and effort now being put into plating research wouldn't be of more value in the long run if spent in educating the public as to what it should and should not expect of a finish.

Nathaniel Hall

Spray Cleaning, Pickling and Phosphating

Study of Operating Conditions

By A. J. Steiger

SPRAY-JET methods which combine mechanical and chemical action are being widely applied in the Russian auto, tractor and farm machinery factories for cleaning, pickling, and rustproofing metal parts on a continuous basis, the Moscow trade press reports. Higher productivity, shorter treatment time, and improved quality are stated to be among the chief advantages of the spray processes now widely introduced as the most suitable for gearing metal treating operations into more highly automated production lines, the Russian report makes clear.

Intensive research has been promoted to develop the most effective technology and to design high-speed automatic units for jet cleaning operations; that carried out by the USSR's top research institute in the automotive industries was recently disclosed in the Moscow trade paper *Avtomobilnaya i Traktornaya Promyshlennost.* Summarized in this report are the main points developed by the exhaustive Soviet studies in the field. The Russian investigations were carried out on a semi-industrial scale in an experimental unit especially designed for the purpose (Fig. 1).

Spray Cleaning

The problems examined in these studies embraced the dependence of cleaning effectiveness on (a) the angle of the jet direction, (b) the spray spacing relative to the part being cleaned, (c) the nozzle size, (d) duration of cleaning and quantity of solution sprayed, (e) solution pressure, (f) temperature, and (g) concentration. Results were as follows:

(a) The solution jet angle had little effect on the size of the cleaned area. Inasmuch as the force of the solution's impact action declines with reduction of the processing angle, it should be assumed that the impact force knocks off only the main mass of soil, while the quality of surface cleaning depends solely on the solution velocity, the duration, and the temperature.

(b) With an operating angle of 90°, when the space between the jet and the part being processed was increased from 4″ to 12″, the surface cleaning area increased by 25 to 30 per cent owing to expansion of the cross-sectional area of the sprayed jet of solution, which was particularly marked in turbulent fluid outflow.

(c) Cleaned area expands disproportionately to the nozzle size. When several nozzles are used the cleaning area is greater than it is with a single nozzle of equivalent total diameter. Consequently, it is expedient to use, instead of one large nozzle, several smaller nozzles with combined cross-section equivalent to the large one.

(d) Relative to duration of jet action, it was established that, for all nozzles tested, cleaning was unsatisfactory when the time was 0.5, 1.0 and 2 minutes. With three-minute duration of spray action the cleaning area for sprays with three nozzles was 20 sq. in., for all others it was 25 sq. in. The quality was satisfactory in all cases. It follows from the data derived that the number of spray nozzles in cleaning has its optimum; further increase in the number of nozzles, i.e. increase in the quantity of solution sprayed on the metal part, does not lead to reduction of the duration of degreasing.

The relation of spraying time to surface preparation was examined in specimens with scratch-brushed surface and those with scratch-brushed surface covered with rust formed during 20 days storage under atmospheric conditions. The spray unit had nine nozzles 0.060″ in diameter and, during the test, solution pressure was 15 and 45 p.s.i. Simultaneously, cleaning was carried out by immersion in a still bath, for comparison. Table I shows the test results.

TABLE I

Processing Conditions	*Cleaning time — minutes*	
	Scratch-brushed	*Scratch-brushed with rust*
45 lbs./sq. in. pressure	0.5	2
15 lbs./sq. in. pressure	3.0	5
Immersion in still tank at 90°C.	30	40

(e) The results of the examination of the dependence of cleaning area on the solution pressure are shown in Table II.

TABLE II

Solution Pressure	*Average Area of cleaning in sq. in. with nozzle diameter*	
	0.060″	*0.120″*
15 lbs./sq. in.	.93	1.6
30 lbs./sq. in.	4.4	8.1
45 lbs./sq. in.	7.5	14.0

(f) Cleaning effectiveness as it depends on solution

temperature was determined with the same nine-nozzle unit at temperatures of 20, 40, 60 and 80°C. and solution pressure of 45 p.s.i. Cleaning times were to 4, 1.0, 0.5 and 0.3 minutes.

(g) Dependence of the effectiveness of degreasing on solution concentration was examined in four solutions, at 40° temperature, 45 p.s.i. pressure and 300 mm space between sprayer and article. The same nine-outlet sprayer was used. Results are summarized in Table 3 below.

TABLE III

Solution No.	Composition of solution in grams/liter: Caustic soda	Soda ash	Sodium silicate	Cleaning time in seconds
1	50	50	10	30
2	25	25	5	30
3	16.6	16.6	3.3	45
4	12.5	12.5	2.5	60

Cleaning time was not reduced if the concentration exceeded that of solution 2.

The experimental unit (Fig. 1) used for developing the finishing process was a chamber 59″ x 28″ in size, mounted on a rigid framework. The spray unit inside consisted of a series of vertically arranged pipes each 0.4″ in diameter with holes for delivery of cleaning solution. Windows on opposite sides of the chamber are provided for observing the cleaning process. A trolley for holding specimens runs over the top of the chamber; in its bottom is the tank of cleaning solution, which is recirculated.

The solution used in the tests consisted of 15 g./l. caustic soda, 15 g./l. soda ash, 3 g./l. sodium silicate, at a temperature of 40 to 70°C. and pressures of 30 and 45 p.s.i. Cleaned from the specimens (sheet metal, angle iron, metal utensils, etc.) was fatty dirt (50 per cent spindle oil and 50 per cent gun-grease). The final cycle consisted of:

1. Cleaning for 0.75 to 1.0 minute at 70 to 80°C.
2. Warm rinsing for 0.3 to 0.5 minute at 60 to 70°C.
3. Cold rinsing for 0.3 to 0.5 minute at 15 to 20°C.

Spray Pickling

Spray methods of pickling are a relatively recent innovation in Russia and, with the object of determining optimum processing, the Russian auto-tractor research institute carried out extensive studies using an experimental unit similar to that developed in the cleaning tests.

The problems examined, according to the Moscow report, covered the effectiveness of pickling as it depends on (a) the angle direction of the spray jet, (b) the nozzle size, (c) solution velocity, and (d) solution temperature. Also tested were (e) the degree of metal saturation with hydrogen and (f) the influence of iron salts on pickling effectiveness.

(a) The research tests showed that the time of spray pickling increases with reduction of the processing angle and at its zero value is double what it is in processing at an angle of 90°. This reduction in pickling time with increase in angle is connected with heightening of the jet's mechanical effect.

(b) The investigation of the dependence of metal loss at a definite solution velocity on the quantity of acid solution sprayed, i.e. on the nozzle size, established that even a more than twenty-fold increase of the quantity of solution sprayed from the nozzles onto the metal parts does not affect the magnitude of the metal loss (Fig. 2).

(c) Spray pickling of pure metal with 20 per cent sulfuric acid at a temperature of 20-25°C. and solution

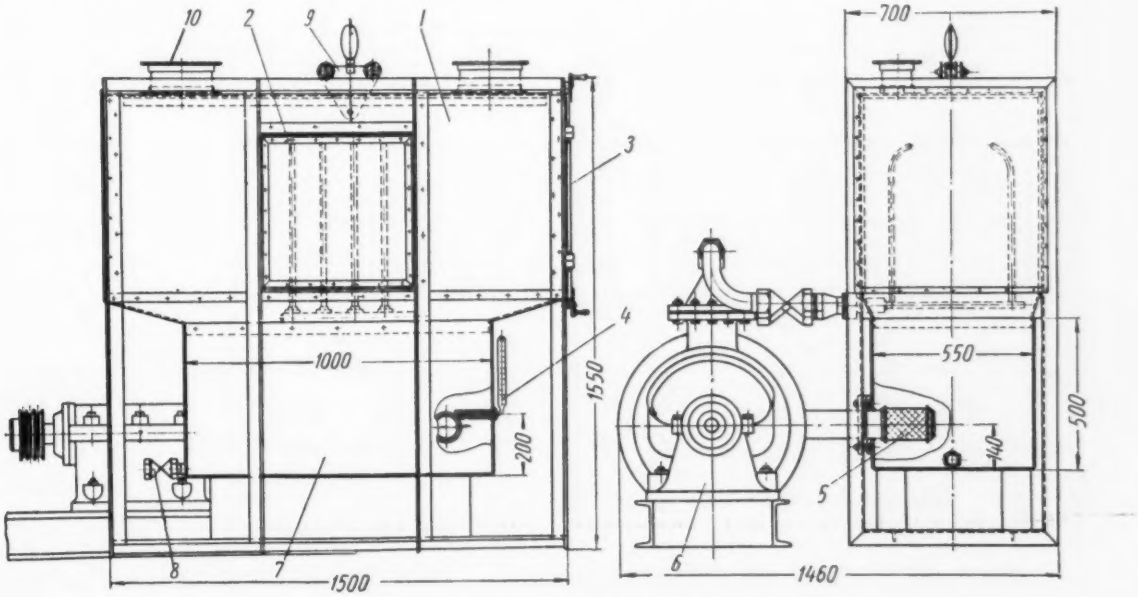


Fig. 1. Diagram of experimental unit for spray treatment.*

1—chamber of vinyl sheet; 2—collector pipes; 3—gate; 4—thermometer; 5—filter; 6—acidproof pump; 7—acid tank; 8—valve; 9—conveyor trolley; 10—ventilation openings.

*Dimensions in mm.

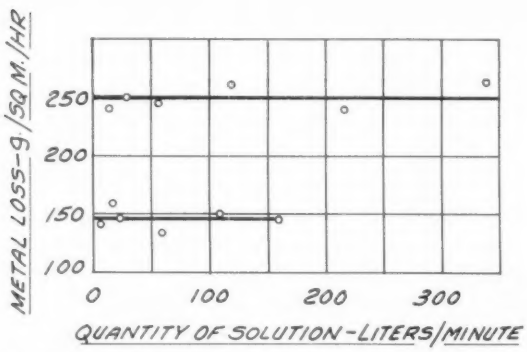


Fig. 2. Dependence of metal loss on quantity of solution sprayed on metal part.

velocity of 50 ft./sec. is one-and-a-half to two times more effective than in a stationary bath. Further increases of solution velocity increases metal losses to a high degree and, at a velocity of 100 ft./sec., pickling is upwards of five times more effective than in a stationary bath.

Spray pickling of pure metal with non-inhibited hydrochloric acid at solution velocity reaching 65 ft./sec. is two to three times more effective than in a stationary bath. At a solution velocity exceeding 65 ft./sec., pickling time is 15 to 25 times less than in a stationary bath.

The duration of spray pickling of pure metal with inhibited acid at solution velocity reaching 65 ft./sec. is one-and-a-half to two times greater than the pickling time with non-inhibited acid of the same concentration. When solution velocity of inhibited acid is more than 65 ft./sec., pickling time is increased.

Depending on acid concentration, the pickling effectiveness at hydrochloric acid solution velocities of 75 ft./sec. is three to six times, and at velocities of more than 85 ft./sec. is ten to fifteen times higher than in stationary baths without agitation.

The time required for removal of rust by 10 per cent acid (Fig. 3a) remains constant to a solution velocity of 75 ft./sec. When acid concentration is more than 10 percent, the effect of solution velocity increases and pickling efficiency rises. Time required with 5, 10 and 15 per cent acid (Fig. 3b) does not vary until solution velocity reaches 75 ft./sec. and, with further rise of velocity, it is reduced. In all cases the time required with inhibited acid is greater than it is with uninhibited acid, which can be explained by the foaming of the acid solution with the inhibitor.

(d) In the tests of the temperature factor, a 20 per cent solution of sulfuric acid at a velocity of 60 ft./sec. was used (Fig. 4). The temperature factor was found to exceed that for a stationary bath one-and-a-half times, which is explained by the intensification of erosion due to the reduction of the strength of the oxide films formed on the metal.

(e) The results of the tests on the degree of metal saturation with hydrogen are shown in Table IV. Used in the study was a 20 per cent sulfuric acid solution at velocity of 60 ft./sec.

TABLE IV

Pickling Temperature °C.	*Percent Saturation with Hydrogen*	
	Spray	*Still Bath, unagitated*
20	....	15
40	12	26
60	13	67

The degree of metal saturation with hydrogen is reduced in spray pickling because the hydrogen which forms is easily torn loose from the metal by the moving stream of liquid.

(f) The influence of iron salts on the effectiveness was examined in a 20 per cent sulfuric acid solution with the addition of ferrous sulfate, at a temperature of 20 to 25°. The tests showed that the addition of 50 to 250 g./l. of ferrous sulfate, either in spray or still bath pickling, did not affect the process of removing scale and rust from the metal.

Spray pickling of pure metal without scale and rust

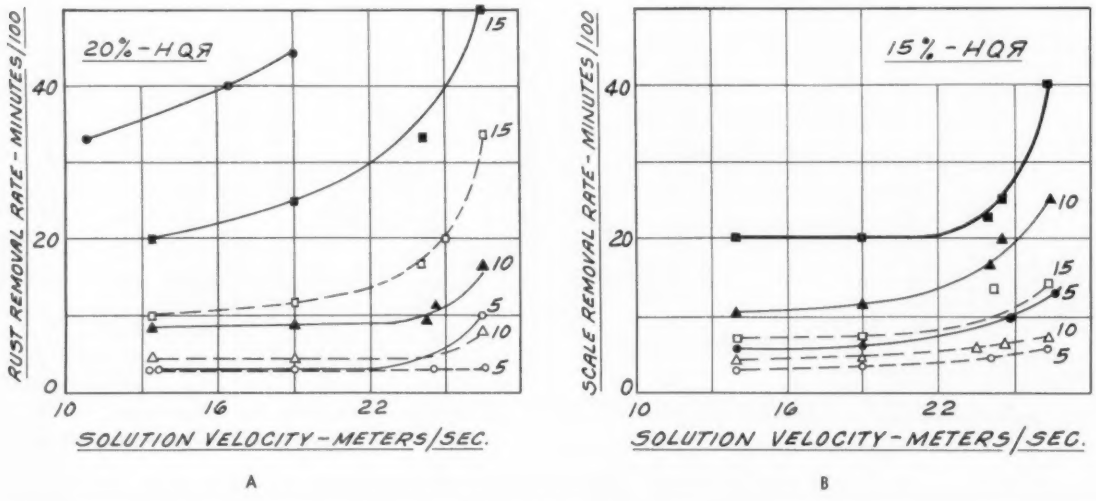


Fig. 3. Dependence of rate of pickling rust (a) and scale (b) on velocity of acid solutions of varied concentrations: uninhibited (solid lines) and inhibited (dotted lines).

in an acid solution with additions of ferrous sulfate substantially increases metal losses, and the more so, the higher the solution velocity. This occurs in consequence of the oxidation of divalent iron to trivalent, by oxygen of the air, which accelerates the pickling process. After pickling with additions of ferrous sulfate in large quantity, the metal surface resembles a surface after fine and sand-blasting, which can find explanation in the presence of suspended matter in the solution.

Table V shows average data of tests made, in pickling rust from sheets and angle irons coupled by bolts, with an acid solution under pressure of 30 p.s.i. The spray process is three to five times more rapid than is the still bath.

TABLE V

Pickling solution	*Pickling time, minutes 40-45°C.*	*20-25°C.*	*Pickling Quality*
20% hydrochloric acid	1.5 to 2.0	0.5 to 0.6	Residue Absent
10% hydrochloric acid	4.0 to 5.0	—	—
20% sulfuric acid	—	8 to 10	Negligible film of residue, which is removed in next spray processing

Following the investigation, a preferred process of spray treating metal pieces to remove grease, rust and scale was developed that is several times more effective than the still bath process. The details of this jet method are given in Table VI.

TABLE VI

Number	*Operation*	*Velocity of solution in ft./sec.*	*Temperature of solution or medium, C.°*	*Time minutes*
1	Degreasing in solution of caustic soda (15 g./l.); soda ash (15 g./l.); sodium silicate (3 g./l).	65-85	75-80	0.75-1.0
2	Rinsing in running water	65-85	50-60	0.3-0.5
3	Same	65-85	20-25	0.3-0.5
4	Pickling in solution of hydrochloric acid (150-200 g./l), or sulfuric acid (100-150 g./l.)	50-65 50-65	20-25 70-80	2-3 5-6
5	Rinsing in running water	65-85	40-50	0.3-0.5
6	Same	65-85	15-20	0.3-0.5
7	Neutralization in solution of trisodium phosphate (30 g./l.)	65-85	40-50	0.3-0.5
8	Rinsing in running water	65-85	20-25	0.3-0.5
9	Same	65-85	80-90	0.3-0.5
10	Drying	—	100-120	5-7

Note: When pickling metal utensils before enameling, operations 8 and 9 are not carried out, and operation 7 is completed at a temperature of 80-90°. When pickling articles of cold-rolled steel, operations 4 and 8 are not used.

Spray Phosphating

In the Russian automotive industry the spray method of phosphating is supplanting the conventional

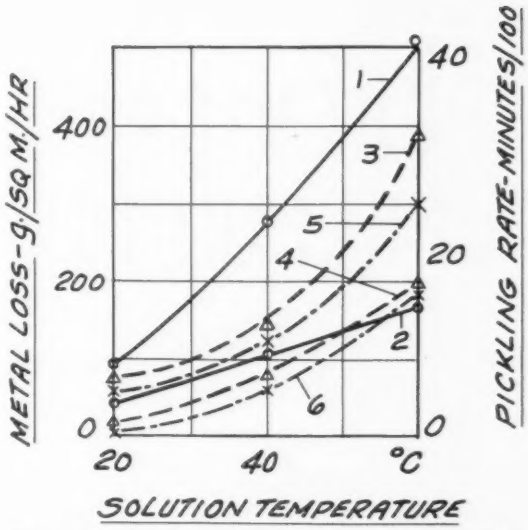


Fig. 4. Dependence of metal loss and rate of oxide removal on temperature of 20% sulfuric acid solution: 1—metal loss in spray pickling; 2—same in still bath; 3—rate of rust removal in spray pickling; 4—same in still bath; 5—rate of scale removal in spray pickling; 6—same in still bath.

treatment in still baths. The method developed by the auto-tractor research institute is termed a spray process of cold phosphating, and is based on a solution of zinc monophosphate.

According to the Moscow report, the rustproofing solution consists of 23-25 g./l. zinc oxide, 27-29 g./l. phosphoric acid, 30-35 g./l. nitric acid, 0.3-0.5 g./l. sodium hypochlorite and 0.1-0.2 g./l. sodium nitrite. Total acidity of the solution is given as 58-60 points, pH of solution 2.4-2.7, temperature 25-30°C., time, three to five minutes.

After appropriate treatment, the rustproofed articles go through passivation in a solution of potassium dichromate (0.2 to 0.5 g./l.) at a temperature of 70-80°C. for one to two minutes.

The phosphate coating obtained by the spray method is not inferior, in efficiency and corrosion resistance, to the oxide film obtained from an alkaline solution, and the phosphate film obtained in hot phosphating.

The economics of alkaline oxide coating, and hot and cold phosphating are compared in Table VII to illustrate the advantages of the Russian process.

TABLE VII

	Hot Processes		*Cold Phosphating*	
	Alkaline oxide coating	*Hot phosphating*	*Still tank*	*Spray method*
Time required, in minutes	80	80	15	5
Solution temperature, °C.	140	96	30	30
Number of operations	18	32	17	17
Electric power consumption for initial heating and operation of 1 liter of basic solution for one hour, in kw.	0.21	0.12	0.02	0.02
Cost of chemicals for 1 sq. meter of surface, in rubles	0.23	1.93	0.21	0.21

CHEMICAL POLISHING

By Lester F. Spencer,

Finishing Engineer, West Allis 19, Wis.

Introduction

ONE of the more recently developed procedures in the finishing of certain metals and alloys is that of chemical polishing. This simple immersion treatment in producing a reflective surface has been used to advantage in the polishing of fabricated shapes which are either of intricate design, or of such size that they are not only difficult but often impossible to polish by wheels. Alhough little is known concerning the mechanism involved, chemical polishing will represent appreciable cost savings provided the scope and the limitations of the process are recognized in the design of component parts.

Basically, chemical polishing is very similar to electropolishing both in function and in scope; however, the former method has several important economic and practical advantages. In comparison to electropolishing, chemical polishing does not require the high initial capital investment in equipment, it being limited to the tank itself. In addition, where the parts are not polished as part of a plating sequence, chemical polishing can be performed either in baskets or simple suspension fixtures; the laboratory control of the solution and the operating conditions are less critical than experienced with electropolishing; and, the labor costs are considerably lower. As in electropolishing, a chemically polished finish is quite different from that obtained by mechanical polishing. It is usually considered unsatisfactory where an undistorted mirror image is required. However, on surfaces that are rounded or broken, chemically polished surfaces are frequently indistinguishable from a mechanically polished surface. In contrast to bright dipping, a chemical polishing solution is non-etching. Parts have been polished to a maximum luster and then left immersed until the metal dissolved to paper thinness with no evidence of etching or loss or reflectivity.

The basic process would consist of (a) a cleaning procedure which may comprise vapor degreasing or a solvent emulsion cleaner for the removal of hydrocarbon soil, followed by immersion in a hot solution of mild inhibited cleaner; (b) immersion in a hot chemical polishing solution; those factors of solution composition, time of immersion, and operating temperature being dependent upon both the alloy type and its surface condition; (c) possibly a dilute acid dip to remove thin films; and finally, (d) immersion in suitable rinses after which parts may either be dried and lacquered, or, may be directly plated.

Theory of Chemical Polishing

While the basic mechanism of chemical polishing is not too well known, it may be well to present a theory offered by Pinner,[1] to the effect that passivation phenomena are involved, a thin film probably composed of oxides or basic salts of the metal, being present on the surface during polishing.

Basically, chemical polishing solutions contain an oxidizing agent, which replaces the electric current used in electropolishing, as well as an anion which is capable of dissolving the film formed at a slow controlled rate. Sometimes the oxidizing agent, e.g., nitric acid, hydrogen peroxide, or dichromate, may act both as an oxidizing or a reducing agent depending upon the degree of dissociation or the pH at the metal surface. The choice of anion is dictated by the speed of reaction on the film and the rate of diffusion of its reaction products with the metal away from the surface; large anions capable of forming complexions are particularly suitable.

The rate of diffusion of the metal ions controls the rate of dissolution of the film which, in turn, controls its rate of growth, thickness, and physical properties. The presence of this film prevents etching of the surface by causing the metal atoms to be attacked according to their proximity to pores and discontinuities in the constantly changing film, rather than in accordance wih their position in the crystal lattice or grain boundaries of the metal. The surface is smoothed as slower diffusion of metal ions from micro-depressions than from micro-elevations of the surface causes the film over the latter to be dissolved at a greater speed. This effect, however, is influenced also by the fact that local concentration of metal ions at depressions causes a higher pH at these points. This has an important bearing on the function of the oxidizing agent; e.g., in the case of nitric acid, it affects the concentration of the undissociated molecule which is the oxidizing agent while, with hydrogen peroxide, the pH is a factor determining whether the molecule acts as an oxidizing or reducing agent.

The nature of the solvent depends upon the other constitutents. Non-aqueous protophilic solvents, e. g., acetic acid, are used in some processes. The best results as regards both economy and simplicity of operation are obtained when water can be used. Other additions, e.g., neutral salts which buffer the solution, may be made while small amounts of other anions, e.g., chlorides, may be necessary under some conditions. The latter increases the speed of film dissolution locally and causes it to increase its thickness generally; this type of effect is common where film forming mechanisms are involved.

Copper and Copper Base Alloys

Chemical bright dips have been used for many years as a pretreatment for organic and non-decorative

TABLE I

Solution Rate of Copper and Its Alloys in Sulfuric—Nitric Acid Solutions.

*Bath Composition**			*Dissolution in 30 seconds (x 0.001")*						
			Brass		*18% Nickel Silver*		*Phosphor-Bronze, Type A*		*Copper*
Sulfuric Acid, %	*Nitric Acid, %*	*Water %*	*Cold*	*158/175°F.*	*Cold*	*158/175°F.*	*Cold*	*158/175°F.*	*160°F.*
25	75	0	2.0	2.4	0.4	0.65	0.5	0.85	—
75	25	0	0.05	0.15	0.15	0.15	0.05	0.20	nil
50	37.5	12.5	0.20	0.35	—	—	—	—	—
0	100	0	2.5	—	1.5	12.5	3.5	7.5	7
0	25	75	2.5	—	2.5	9.0	1.5	4.5	<1
16.7	16.7	66.7	—	—	0.5	—	0.05	—	7

*% by volume 1.84 sp. gr. sulfuric acid and 1.42 sp. gr. nitric acid. Values for brass, nickel silver and phosphor-bronze in accordance with Armstrong[7] as quoted by Pinner[1]; Values for copper in accordance with Snavely and Faust[6]

electroplated finishes, mainly aqueous solutions of sulfuric acid in combination with an oxidizing agent, as exemplified by chromic acid, ferric sulfate, dichromates, or nitric acid. The rate of attack[6] is controlled by the relative amount of sulfuric acid and the selected oxidizing agent, whereas, the rate of dissolution is dependent upon the operating temperature of the bath. One of the more important solution types that are employed for bright dipping copper and brass is the aqueous solution of nitric and sulfuric acid along with a suitable inhibitor to slow down the reaction. These solutions brighten the work but do not appreciably smoothen the surface[6] and, if the immersion time is too long, etching will occur. The solution rate of copper and some copper alloys in various concentrations of the sulfuric-nitric acid bath is given in Table I.

The mutual influence of the various constituents of this bright dipping bath can be expressed by quoting the comments presented by Pinner[1] — "Nitric acid alone dissolves copper in all concentrations. In concentrated solutions, that is, where the comparative lack of water suppresses the dissociation of nitric acid, a brown film is formed on the metal surface, but less concentrated solutions dissolve copper both rapidly and cleanly. The presence of sulfuric acid slows down the reaction between nitric acid and copper. Indeed, in the absence of water, complete passivity is obtained in nitric acid solutions containing as little as 20% concentrated sulfuric acid at 80 to 100°C. (175 to 212°F.) after a violent reaction. The addition of water or chloride destroys this passivity. Non-aqueous solutions containing nitric, sulfuric, and hydrochloric acid are employed for the treatment of copper and brass, though only rarely. Attack is slow and the effect is more that of a controlled removal of metal rather than a surface brightener."

A common bright dip analysis, as given below, contains a small proportion of hydrochloric acid which is stated[1] to increase brightness and to reduce the objectionable 'orange peel' type of etching. In addition, the hydrochloric acid addition is stated to assist in the solution of zinc when bright dipping brass, whereas, the nitric acid has a preferential attack on the copper constituent. This solution is generally used at room temperature. The hydrochloric acid content is critical; a concentration of 0.5% is preferred[1] where descaling is to be performed, whereas, a concentration of 0.2% is used for bright dipping where the surface appearance is of importance. This bright dip bath would consist of:

Sulfuric acid	42.0% (by vol.)
Nitric acid	8.0%
Hydrochloric acid	0.2 to 0.5%
Water	Remainder

The use of inhibitors will not only decrease the activity of the sulfuric-nitric acid bath, but will also tend to minimize fuming. The addition of 1.0% soot, which is a commonly used inhibitor, is stated to reduce nitric acid to nitrous acid[1,2] which is believed to be formed in the oxidation of copper by nitric acid.[1,3] Another inhibitor type is the combination of sodium nitrate (Solution A) and sodium chloride; the rate of attack being reduced to an extent where it can be used for the bright dipping of copper and brass electroplates[1]. Other inhibitors would include chromic acid[2,7,8] which will retard metal attack and suppress nitric acid fumes; organic nitrogen derivatives of high molecular weight;[1] and occasionally both arsenic or antimony. Two of the more commonly used formulas according to Pinner would be:—

Solution A

Sulfuric acid (d. 1.84)	75 cc.
Nitric acid (36° Bé)	75 cc.
Water	140 cc.
Sodium nitrate	3.0 g.
Sodium chloride	1.5 g.

Solution B

Sulfuric acid (d. 1.735)	120 gal.
Nitric acid (d. 1.37)	1 gal.
Chromic acid	100 lbs.
Hydrochloric acid (d. 1.16)	20 gal.
Water	60 gal.

According to Snavely and Faust,[6] concentrated solutions are usually satisfactory for individually racked work but bulk dipping requires aqueous solutions to slow down the action and minimize staining. The use of bright dips at room temperature is preferred for the same reason and, in some instances, cooling coils

are employed to prevent any temperature rise. A solution containiing[9] sodium dichromate 27 oz./gal., sodium nitrate 27 oz./gal., and sodium bisulphite 40 oz./gal. operated at 145/150°F. is, however, useful when there is an unavoidable delay between dipping and rinsing. Due to the high concentration of alkali metal, the rate of reaction falls off sharply with decreasing temperature and the attack on the metal virtually ceases when it is withdrawn from the bath.

Although there is little difference between the overall smoothening action of bright dipping and chemical polishing of the copper base alloys, Fig. 1 aptly illustrates that there is a considerable difference in the quality of the finish that is obtained. Thus, while the smoothening action on the larger surface irregularities is similar, the chemical polishing action produces a higher micro-polishing action which, in turn, will improve the reflectivity of the surface.

The Battelle process[10], which is basically a phosphoric-nitric-acetic acid mixture, is suited for the chemical polishing of copper and the single phase copper base alloys that contain either zinc, and/or, nickel. This would include such alloys classified under the alpha brasses — normally those copper base alloys containing 35% or less of zinc within the analysis, as exemplified by gliding metal, commercial bronze, red brass, low brass, cartridges brass, and yellow brass; the nickel silver alloys; and the high nickel alloys such as Monel and nickel. The proportion of the constituents of this bath will vary widely according to the material treated; the ranges given are listed below. A typical bath composition for the polishing of copper and the alpha brasses is also given under Solution B. It was emphasized that the presence of water is considered detrimental to the finish and the allowable maximum is placed at 10% by volume.

Composition Range

Phosphoric acid (d. 1.75)	30 to 90% (by vol.)
Nitric acid (d. 1.42)	5 to 20%
Acetic acid (glacial)	10 to 50%

Solution for Polishing Copper and Alpha Brasses.

Phosphoric acid	55%/vol.
Nitric acid	20%
Glacial acetic acid	25%

Pray, Igelsrud and Simard [11] have presented two solution types in which are included hydrochloric acid and sodium chloride respectively, which presumably act as inhibiting agents in a phosphoric-nitric-acetic solution. Type A, which is given below, is operated at 190°F. with immersion times up to 5 minutes, whereas solution B is operated at 150°F. with immersion times up to 4 minutes. These solution types are:—

Solution A

Nitric acid (d. 1.42)	20%
Acetic acid (d. 1.05)	25%
Phosphoric acid (d. 1.07)	55%
Hydrochloric acid	0.5%

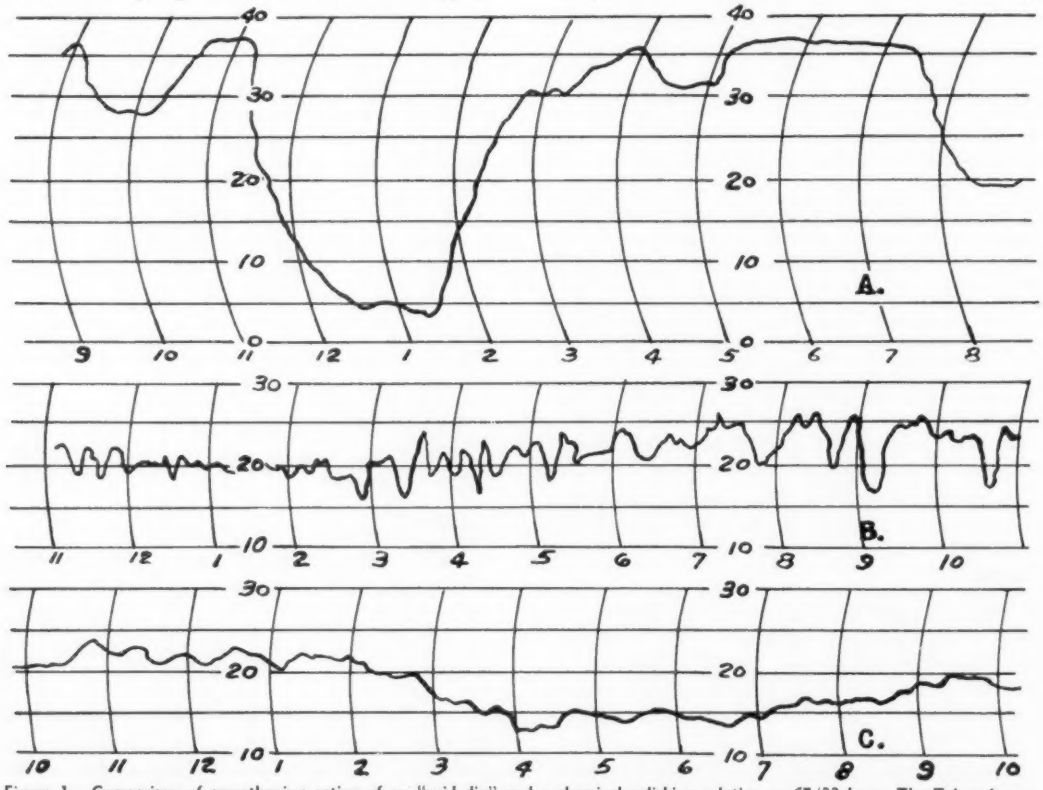


Figure 1. Comparison of smoothening action of an "acid dip" and a chemical polishing solution on 67/33 brass. The Talysurf magnifications were 10,000X on the vertical and 50X on the horizontal scale but have been reduced to half this in reproduction.
A. Untreated. B. After treatment in sulfuric-nitric-hydrochloric bright dip C. After chemical polishing in cold aqueous phosphoric-nitric acid process[10]

TABLE 1A

Surface Finish on Nickel, Brass and Aluminum by Chemical Polishing after Dry Belt Polishing.

Metal	Dry Belt Grit	Profilometer Measurements — μ Inches, (RMS)					
		As Belt Polished	After Chemical Polishing For				
			1 min.	1.5 min.	2 min.	3 min.	6 min.
Dull Nickel Plate*	120	25	24	—	21	—	—
	150	27	23	—	18	—	—
	180	17	14	—	14	—	—
Aluminum (1100-H14)	180	40	28	—	23	22	—
	240	80	60	—	50	50	—
Brass (70/30)	180	30	—	30	—	24	16
	180	30**	—	27	—	20	16
	240	26	—	21	—	17	15
	240	26**	—	21	—	18	16

*Dull nickel plate was over steel, belt polished as shown in second column. Third column shows nickel plate smoothness. No mechanical polishing on nickel plate.
**Higher temperature for chemical polishing than other brass specimens.

Solution B

Nitric acid (d. 1.42)	40%
Acetic acid (d. 1.05)	30%
Phosphoric acid (d. 1.07)	30%
Sodium chloride	1%

According to Snavely and Faust[6] the hydrochloric acid addition is particularly suited for the chemical polishing of Monel and nickel-silver. Upon the removal of 0.0005 to 0.002 inches of metal during the recommended immersion time, the brilliance of the surface is at a maximum. In some instances, especially where an initially rough surface is encountered, a longer dipping time may give additional smoothening. An important factor is that etching does not occur regardless of the immersion time.

As to the initial surface condition of the part to be polished, it has been stated[6] that dull copper plate, resulting from an acid sulfate bath, and dull brass plate cannot be made bright by a practicable amount of chemical polishing. Semi-bright and off-luster bright plates can be made uniformily bright by short immersion periods. Farrell[38] presented Table Ia which illustrates the amount of smoothening provided by chemical polishing.

The acetic acid-containing solutions require mechanical agitation to avoid streaking by gas bubbles, efficient fume extraction is essential and, in order to maintain a solution temperature within recommended limits, thermostatic control may be required. Due to the chloride addition to these solutions, the thin film on polished surfaces is removed by a brief dip in a second solution containing[1] a high acetic acid concentration, which is used at room temperature.

In a discussion of chemical polishing solutions containing acetic acid, Pinner has stated that, while good quality finishes can be obtained, they possess several disadvantages which will include:—

(a) At the high temperatures employed, acetic and nitric acid are extremely volatile and the solutions are, therefore, unstable and difficult to control. This requires efficient fume extraction.

(b) The rate of reaction is fast, and the large amount of metal which must be removed to obtain the best results will indicate that (1) the process is not suitable for components where dimensional tolerances have to be observed, and, (2) the dissolved metal content of the solution rises rapidly.

(c) The concentrated acid solutions are expensive, while solutions containing acetic acid, which have the best smoothening action, will polish well up to a dissolved metal content of 30 to 40 g./l. Regeneration of spent solution is not economical.

(d) Addition of water is detrimental to the finish and, hence, pre-treatments in aqueous solutions, which might cause carry-over of water, must be avoided.

(e) The tank material, which is usually stainless steel, is expensive.

In order to circumvent the above listed disadvantages, Pinner has disclosed a new type[12] which comprises a dilute solution of phosphoric acid, nitric acid and hydrochloric acid with certain addition agents. It has been stated that this solution possesses certain advantages over the phosphoric-nitric-acetic acid bath in that the copper base alloys containing a small amount of beta phase (those that contain from 35% to 39% zinc) and alloys that contain up to 2.0% lead may be satisfactorily polished. The optimum operating range of this solution is from 25° to 35°C. (77° to 95°F.); however, since operating temperatures are not too critical, it has been stated that a satisfactory polish can be obtained at temperatures up to 55°C. (130°F.). As the reaction is exothermic, care should be taken not to overload the bath; a recommended loading being about 0.2 sq. ft. per gallon of solution. As in other solution types, mechanical agitation is recommended. In addition, the time of immersion will be dependent upon the original surface condition; this factor varying

from 2 to 4 minutes during which a metal removal of from 0.0003 to 0.0004 inches is realized.

This solution can be maintained by the addition of nitric acid, stated to be the reason for the increase in metal solution capacity, which may be upward of 300 grams per liter of solution without loss of polishing efficiency. In addition, it is not sensitive to water and, since it is less corrosive, earthware tanks may be employed.

Pinner has indicated the dissolution rates for brass in a phosphoric-nitric-acetic acid chemical polishing solution. This is curve C in Fig. 2. This is compared with other related solutions which includes the nitric-phosphoric-hydrochloric acid-hydrogen peroxide solution (Curve D). Fig. 3 shows the decrease in roughness varying with the amount of metal removal during the course of chemical polishing.

As previously indicated, the chemical polishing solutions thus far used in commercial practice are limited in the alloy types that can be polished. Thus, cast alloys are generally not suited for chemical polishing, primarily due to both alloy composition and grain size. In the wrought alloy form, the majority of the solutions are limited to the single phase alloys previously mentioned; however, even with these alloys the degree of smoothness may vary from lot to lot, or, even have a variable polish in different areas within the same part. Thus, the degree of smoothness will vary

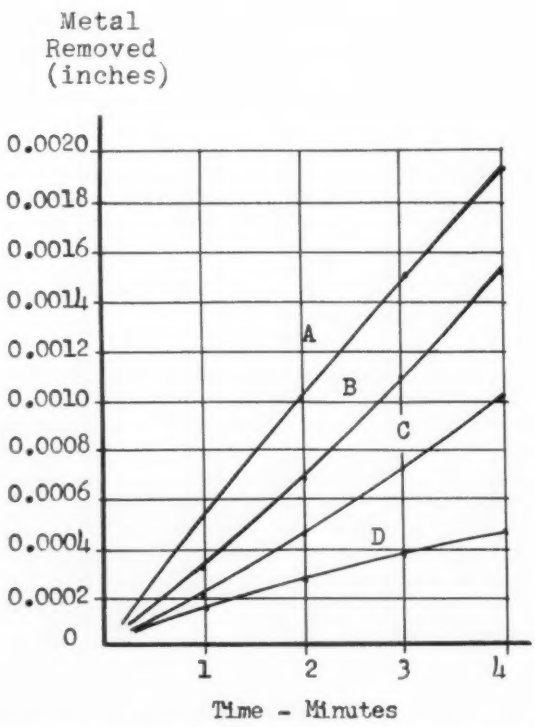


Figure 2. Dissolution of brass in chemical polishing and related solutions.

A. Nitric acid-ammonium nitrate solution, 70°C. (158°F.)
B. Nitric-phosphoric acid solution, 65°C. (149°F.)
C. Nitric-acetic-phosphoric acid solution, 65°C. (149°F.)
D. Nitric-phosphoric-hydrochloric acid-hydrogen peroxide solution, 30°C. (86°F.)

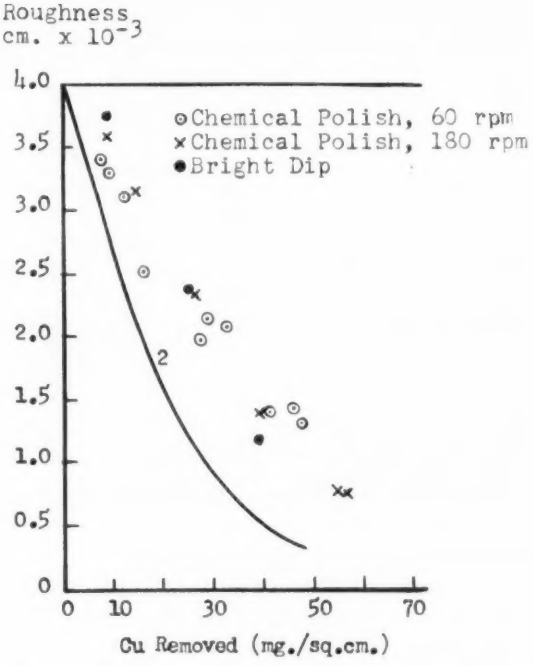


Figure 3. Relation between decrease in roughness and amount of metal removed during chemical polishing of brass[13] in a solution containing:

Phosphoric acid	55%/vol.
Nitric acid	20%
Acetic acid	25%

Curve 2 is a theoretical smoothening efficiency value.

with the grain size of the material. Cold worked surfaces usually polish better than sheet or strip in the annealed condition. The best results would be where the material has a uniformily fine grain size.

Barrel polishing is frequently used to condition the surface prior to the actual chemical polishing operation whenever the shape of the component parts will permit. This operation will frequently remove tool marks, rolling marks, or scratches which, when of considerable depth, ordinarily are quite costly to remove by a chemical polishing procedure. In addition, the time of immersion may be so lengthy that a considerable amount of metal may be removed. Another reason for barrel polishing is that a considerable improvement may result in the over-all polished finish; this being particularly true on surfaces that may be unevenly stressed.

Granite chips, lime chips or steel balls are the preferred abrasive material. Fine abrasive particles should be avoided since they may be included in the metal surface and subsequently leave undesirable pits after chemical polishing. Pinner experienced satisfactory results in finishing brass by barrel polishing from 7 to 12 hours followed by a chemical polishing with a removal of 0.0004" of metal. After barrel polishing, the work is usually rinsed before chemical polishing without the need for further cleaning. The addition of 1.0 to 2.0% sulfuric acid may help to remove alkaline lubricant residues.

(To be continued)

How Grit Blasting Improves Phosphate Coatings*

By Jacob Knanishu, *Ordnance Corps, Metal Finishing Laboratory, Rock Island Arsenal, Rock Island, Ill.*

Abstract

THE rate of formation of a phosphate coating was determined in a nitrate accelerated room temperature phosphating solution using both "as rolled" and grit blasted steel panels.

Coatings produced, after various periods of phosphate treatment, were subjected to salt spray testing. Similar panels coated with lustreless enamel meeting requirements of Specification MIL-E-10687 were tested in the salt spray and in the water immersion tests as required by the above specification.

It was found that a minimum treatment period of 20 minutes in the room temperature phosphating solution was required to produce coatings on grit blasted steel which would provide a minimum of 144 hours protection in the salt spray cabinet, when coated with MIL-E-10687 enamel. When the steel surface was phosphate treated without preliminary grit-blasting, a minimum treatment period of 30 minutes was necessary to provide the required 144 hours resistance to the salt spray cabinet exposure without failure.

Both the unblasted and grit blasted steel panel surfaces required a 20 minute minimum phosphating period to develop a coating, which showed borderline resistance, when exposed for 2 hours in the salt spray (fog) cabinet.

This protective phenomenon is due to finer crystal formation, which occurs during the latter part of the phosphate immersion period. The formation of a finer coating stems from the dissolution of already formed crystals and from the formation of new crystals' nuclei. These conditions increase the number of crystals and therefore a "tighter" and more protective layer is developed.

*The opinions or assertions contained herein are not to be construed as being official or reflecting the views of the Department of the Army.

TABLE I

Salt Spray Exposure of Phosphated Panels

Panel Group	*Panel No.*	*Unblasted Blasted*	*Phosphate Immersion, Minutes*	*10 Min.*	*30 Min.*	*2 Hour*
A	1-2 & 3	UN	2	No effect	rust	rust
G	"	BL	2	"	"	"
B	"	UN	3	"	"	"
H	"	BL	3	"	"	"
C	"	UN	5	"	"	"
I	"	BL	5	"	"	"
D	"	UN	10	"	"	"
J	"	BL	10	"	"	"
E	8-9 & 10	UN	20	"	No effect	Borderline
K	"	BL	20	"	"	"
F	"	UN	30	"	"	"
L	"	BL	30	"	"	"

Panel A (2 minute immersion)

Panel B (3 minute immersion)

Fig. 1. Salt spray (20%) exposure test (144 hours).

Panel C (5 minute immersion)

Panel D (10 minute immersion)

Fig. 2. Salt spray (20%) exposure test (144 hours).

Introduction

This investigation was designed to make an evaluation of the room temperature phosphating process and to make comparative coating weight tests using grit blasted and unblasted panels.

In a future investigation, comparative coating weight tests will be made between the conventional hot phosphating process and the room temperature process with the goal of replacing the former.

The room temperature phosphating process has several superior features in comparison with the hot phosphating process. These advantages are as follows:

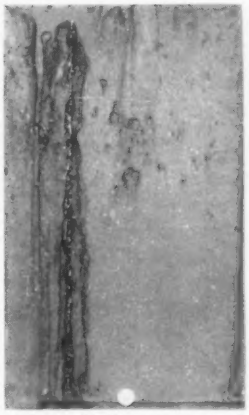
1. 40% less chemicals required.
2. No ventilation equipment necessary.
3. No heating coils required.
4. No fuel required for heating.
5. Improved workman comfort.
6. Stainless steel tanks not required.
7. Coatings have finer crystallinity and superior corrosion resistance.
8. No sludge removal problem.

TABLE II

Salt Spray Exposure of Panels Phosphated Plus Paint (MIL-E-10687)

Panel Group	*Panel No.*	*Unblasted Blasted*	*Phosphate Immersion, Minutes*	*24 Hours*	*48 Hours*	*72 Hours*	*96 Hours*	*144 Hours*
A	8-9 & 10	UN	2	Some rust	Rust & blisters	Rust & blisters	No change	Severe blistering widened scored line
G	"	BL	2	"	Some rust	"	"	Moderate blisters and rust spots
B	"	UN	3	"	Rust & blisters	"	"	Severe blistering widened scored line
H	"	BL	3	"	Some rust	Some rust	"	Moderate blisters and rust spots
C	"	UN	5	"	Rust & blisters	Rust & blisters	"	Severe blistering widened scored line
I	"	BL	5	"	Some rust	Some rust	"	Moderate blisters and rust spots
D	"	UN	10	No change	"	Rust & blisters	"	Severe blistering widened scored line
J	"	BL	10	"	No change	No change	"	Few rust spots, blisters along scored line only
E	1-2 & 3	UN	20	"	"	"	"	" "
K	"	BL	20	"	"	"	"	No change
F	"	UN	30	"	"	"	"	Few rust spots, blisters along scored line only
L	"	BL	30	"	"	"	"	No change

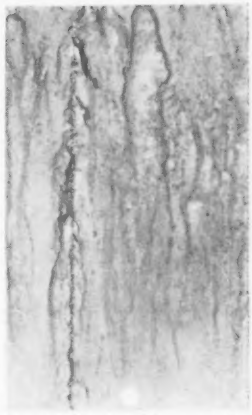
Panel E (20 minute immersion)



Panel F (30 minute immersion)

Fig. 3. Salt spray (20%) exposure test (144 hours)

Panel G (2 minute immersion)



Panel H (3 minute immersion)

Fig. 4. Salt spray (20%) exposure test (144 hours)

This study is a portion of a program concerned with the development of a room temperature phosphating process currently being operated as a pilot plant process.

The immersion period in this process is 30 minutes, which is similar to that used in the hot phosphating operation. As in the latter process, the room temperature phosphated parts are chromic acid dipped. The parts, which are not to be painted, are then dipped in preservative oil.

In this project, different immersion periods were used to determine the advisability of using the shorter periods for the articles, which will eventually be coated with enamel or lacquer.

Procedure

One hundred and sixty-eight steel panels (Specification 1020 cold rolled 26 gauge, Federal Specification QQ-S-633, dated 22 September 1949) were used in the test. The panel size was 4" x $6\frac{3}{32}$", which presents about 50 square inches in total surface area.

After the panels were trichloroethylene vapor degreased, half of the panels were grit blasted using No. 80 steel grit. The other half were not blasted.

The above groups were divided into 2 sections. One section of 42 panels was phosphated only. These panels were used for testing the phosphate coatings in the salt spray (fog) cabinet and for phosphate coating weight determinations. The panels in the other section were phosphated and then coated with 1.0 mil $\pm$ 0.1 mil paint procured under MIL-E-10687.

The painted panels were dried by baking at 300°F. for 30 minutes and air dried for 24 hours thereafter. Of this group, the panels which were destined for the salt spray cabinet exposure were scored vertically 1 inch from the left edge. The remaining painted panels were used in the water immersion tests.

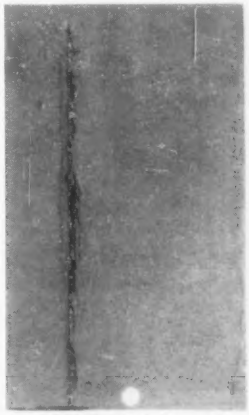
To determine the quality of phosphatization after different periods of treatment, groups of panels were immersed for varying intervals — 2, 3, 5, 10, 20 and 30 minutes.

All panels were rinsed in a chromic acid solution containing 32 ounces of CrO_3 per 100 gallons of water.

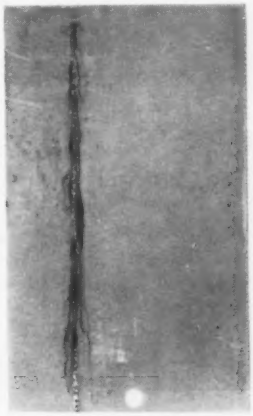
Panel I (5 minute immersion)

Panel J (10 minute immersion)

Fig. 5. Salt spray (20%) exposure test (144 hours)

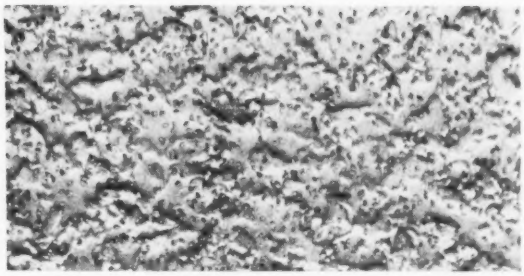


Panel K (20 minute immersion)

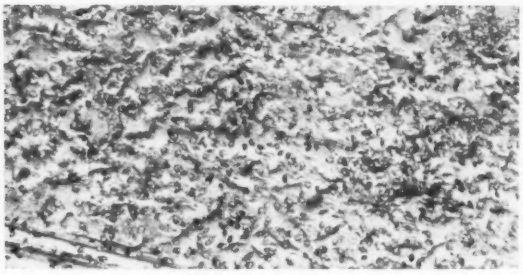


Panel L (30 minute immersion)

Fig. 6. Salt spray (20%) exposure test (144 hours).

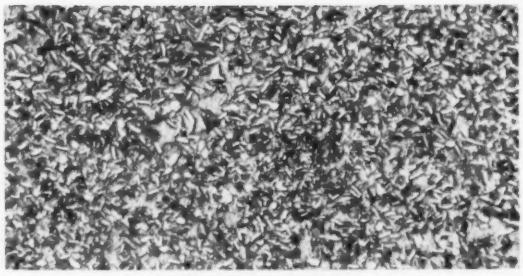


2 minute immersion.

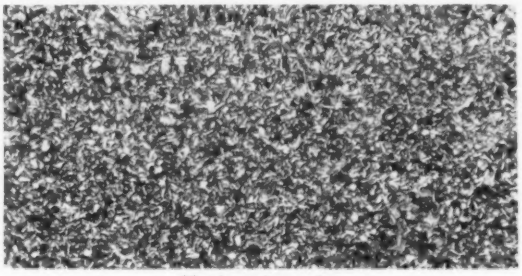


3 minute immersion.

Fig. 7. Photomicrograph of phosphate coatings on clean cold-rolled steel (100 Mag.).



20 minute immersion.



30 minute immersion.

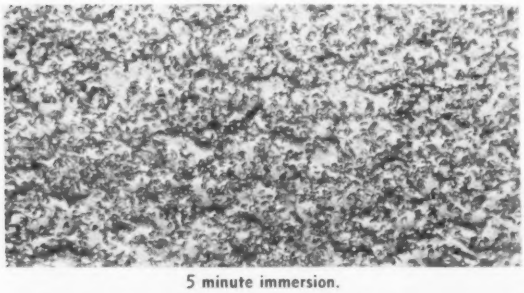
Fig. 9. Photomicrograph of phosphate coatings on clean cold-rolled steel (100 Mag.)

Discussion and Results

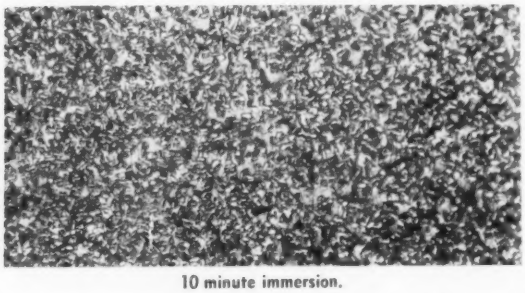
All the panels in these tests were processed simultaneously, since there is fluctuation in the composition of phosphatizing solutions from day to day.

The analysis of the phosphating solution at the time of use was as follows:

Free acid	2.50
Total acid	31.90
Ratio: Total to free	12.70
Ferrous iron	0.41



5 minute immersion.



10 minute immersion.

Fig. 8. Photomicrograph of phosphate coatings on clean cold-rolled steel (100 Mag.)

The chromic acid rinse period, which is 30 seconds, was closely adhered to, since a longer period would promote dissolution of the coating.

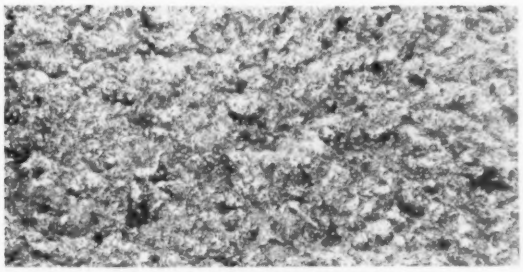
Table I contains a list of the panels which were phosphated only, their period of immersion, and the results of the salt spray cabinet exposure. Included in this table are panels which were degreased (only) prior to phosphating, and those which were degreased then grit blasted prior to phosphating.

In this group, all panels showed a complete breakdown at the end of the 2 hours salt spray exposure, excepting panels which were grit blasted and treated in the phosphating solution for 20 and 30 minutes. These latter groups were evaluated as borderline. All the remaining panels indicated rusting at the 30 minute inspection, and complete breakdown at the end of 2 hours.

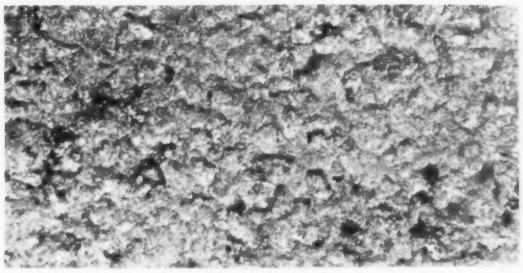
Table II shows the panels by number and their condition at the various stages of exposure. These panels were finished with one coat of MIL-E-10687 (1.0 mil $\pm$ 0.1 mil), a styrenated phthalic alkyd enamel.

At the 24 hour stage, the panels which were phosphated for 2, 3 and 5 minutes, showed small rust spots on their surfaces, while the remainder were unchanged. At 48 hours, the panels which were phosphated for 2, 3 and 5 minutes, began to show blisters and rust, while the 10 minute treated (unblasted only) panels showed rust over their entire surface. The remaining panels were unchanged from the previous inspection.

The inspection at 72 hours revealed further deterioration of the coatings on the 2 minute, grit blasted, and the 10 minute, unblasted panels. Blisters developed at this point in addition to the rust which had already appeared.

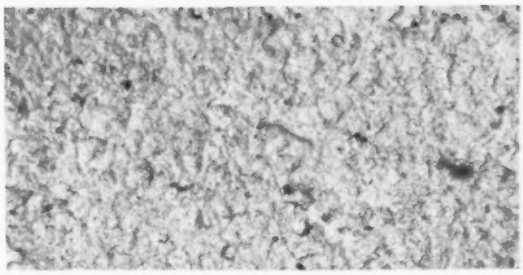


2 minute immersion.

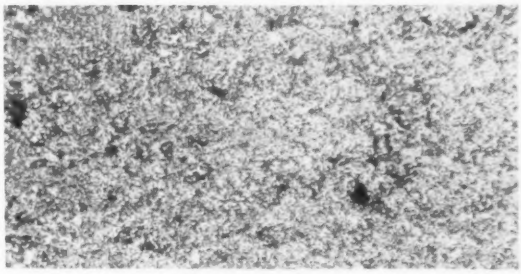


3 minute immersion.

Fig. 10. Photomicrograph of phosphate coatings on grit-blasted cold-rolled steel (100 Mag.).



5 minute immersion.



10 minute immersion.

Fig. 11. Photomicrograph of phosphate coatings on grit-blasted cold-rolled steel (100 Mag.)

At the 96 hours stage there was no discernible change in the condition of any of the panels.

The next and final inspection was made at the 144 hour stage. The last column in Table II shows the degree of breakdown on all panels in this part of the test.

The nonblasted panels, which were phosphated for 2, 3, 5 and 10 minutes, show severe rusting and blistering.

The grit blasted panels, which were treated 2, 3 and 5 minutes, show rusting and moderate blistering.

The panels E, F (unblasted) and J (grit blasted), which were phosphated for 20 and 30 minutes, showed some deterioration for the first time in the form of rust on their surfaces and blisters in close proximity to the scored line.

Finally, the panels K and L (grit blasted), which had been phosphated for 20 and 30 minutes, respectively, showed no impairment throughout the test period.

Figures 1, 2 and 3 show the condition of the series of panels which were phosphated for 2, 3, 5, 10, 20 and 30 minutes, respectively, painted and placed in the salt spray cabinet for 144 hours. This series was unblasted.

In like manner, Figures 4, 5 and 6 show panels, which were grit-blasted, phosphated for 2, 3, 5, 10, 20 and 30 minutes, respectively, painted, then exposed for 144 hours in the salt spray cabinet.

Comparison of the series of panels clearly shows the results of the salt spray exposure tests and illustrates the degree of the effects observed.

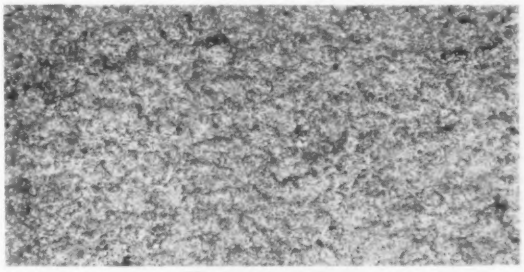
The gradation toward more resistance to breakdown in both series can be seen when following the photographs taken of panels, which were phosphated from 2 to 30 minutes.

Photomicrographs (Figures 7 through 12, 100 X Mag.) of Faxfilm replicas were made of phosphated coatings in each time period of unblasted and grit blasted panels. They show a graduated effect on surface profile and appearance — the crystals become finer as the length of time of immersion is extended.

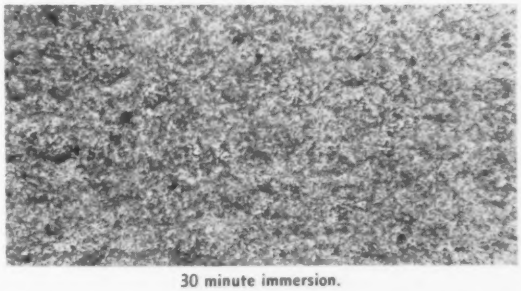
The formation of finer crystals stems from the dissolution of already formed crystals and from the formation of new crystal nuclei. These conditions increase the number of crystals.

Fewer crystals form and grow to a great size at the outset on the unblasted steel surfaces. These crystals impart a high phosphate coating weight, but a poor protective coating as illustrated in Tables I, II and III.

Figure 13 was made from the coating weights of the



25 minute immersion.



30 minute immersion.

Fig. 12. Photomicrograph of phosphate coatings on grit-blasted cold-rolled steel (100 Mag.).

TABLE III
Coating Weight

Panel Group	Unblasted Blasted	Mean Weight in grams of Coating		Mg./Sq. Ft.		Phosphate Immersion, Minutes
A	UN	.0529		152.3		2
G	BL		.1763		507.7	2
B	UN	.0840		242.0		3
H	BL		.1917		550.0	3
C	UN	.1340		386.0		5
I	BL		.1733		500.0	5
D	UN	.2970		855.0		10
J	BL		.3204		925.0	10
E	UN	.4661		1360.0		20
I	BL		.4300		1240.0	20
F	UN	.5124		1433.0		30
K	BL		.5344		1562.0	30

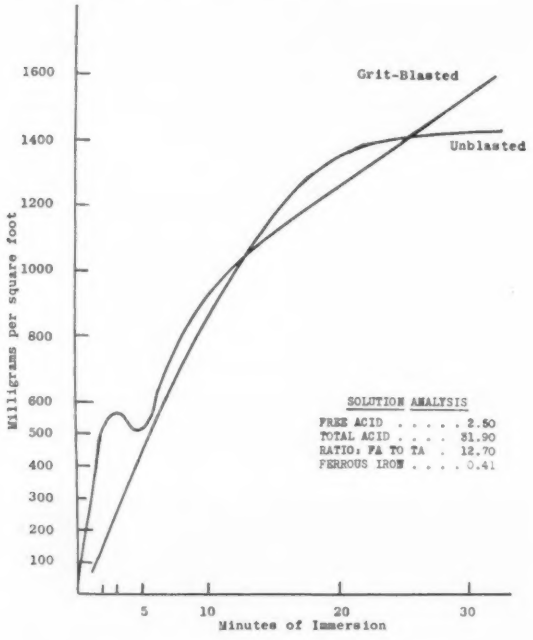


Fig. 13. Phosphate coating weight vs. time of immersion.

two groups of the prepared panels. The curve was plotted by using the time of immersion as the abscissa, and the coating weights in milligrams per square foot as the ordinate.

After 2 minutes, the coating weights of the two groups differ considerably — the grit blasted panels show a greater deposition of phosphate coating. At the end of the 5 minute immersion the two coating weights approach each other closely and remain close through the next 5 minutes up to 10 minutes. During the following 10 minutes, while the vapor-degreased (only) panels were increasing their phosphate coating weight, the grit blasted panels were reducing their coating weight by dissolution. The crystals on the unblasted surface are fewer and continue to increase in size. When the surface is nearly covered, there occurs a reversal in the reaction and the crystals begin to dissolve. This is due, in both cases, to the formation of free phosphoric acid which causes the reaction to reverse, dissolving the ferrous-mono-hydrogen-phosphate and tertiary zinc phosphate.

The following equations depict the reaction of free phosphoric acid on the zinc phosphate coating. Similar reactions occur in the formation and dissolution of ferrous mono-hydrogen-phosphate.

$$Zn(H_2PO_4)_2 \overset{H_2O}{\rightleftharpoons} ZnHPO_4 + H_3PO_4$$

zinc di-hydrogen phosphate — zinc mono-hydrogen phosphate + phosphoric acid

$$3\,ZnHPO_4 \overset{H_2O}{\rightleftharpoons} Zn_3(PO_4)_2 + H_3PO_4$$

tertiary zinc phosphate

Formation of Coating

After 20 minutes, the two groups reversed their relative coating weight build-up rates. At the end of 30 minutes the vapor-degreased (only) panels possessed 1433 milligrams of phosphate coating per square foot, while the grit-blasted panels showed a deposit of 1562 milligrams per square foot, Table III.

In a future investigation, a closer scrutiny will be made of the weights of the coatings obtained by more frequent intervals of withdrawals from the phosphating solutions. This will be done using the room temperature process and the hot phosphating process. By this means more knowledge will be acquired of the undulating curve graphed from the coating weights versus the time of immersion.

Interest Grows in Hot Spray Painting

By Warren Beach, *Eclipse Air Brush Co., Newark, N. J.*

WITH the expanding usage of hot organic coating materials in industry today come improved equipment and know-how for more successful application and quality of finishes. Equally important to the cost-conscious finisher are the economies realized with this relatively new method of spraying. Because heating a coating material reduces its viscosity (greatly reducing the need for thinner), advantages such as, less overspray and fumes, less paint consumed, and more rapid build-up of film thickness with less operator effort, are realized.

Heated pressure tanks have been available for over twenty years. However, because the heating methods employed were too expensive, too complicated, or too hazardous, hot spraying has experienced only limited success. Any method which eliminates the use of a gallon of thinner to every four gallons of paint merits serious attention.

To illustrate our own experience: a black lacquer of 60 seconds in a No. 4 Ford cup at room temperature (70°F.) was heated to 165°F., the usual heated temperature. The viscosity of the lacquer was thereby reduced to 32 seconds. To bring the lacquer down to 32 seconds at room temperature, it was required to thin four gallons of lacquer with one gallon of solvent. In other words, the use of heat eliminated approximately 1 gallon of thinner for every 4 gallons of lacquer.

Heating the air used for atomization also helps, however, not to the same degree. Compressed air expands, while atomizing the paint leaving the gun, cooling the material so that the viscosity is increased. However, most of the atomization seems to have taken place before the cooling effect and the particle size is not reduced much by heating the air. The normal cooling action found in all types of paint spraying affects the finish most by reducing flowout. Sometimes it causes blushing when moisture in the air settles on the cooler wet paint. The use of heated paint and/or air often improves flow-out and prevents blushing.

To spray with heated material at low pressure, the usual components are required. These are: a source of paint under pressure, hose (special fluid hose which will withstand heat), a low pressure spray gun, a source of heat and, perhaps, a pump to circulate the paint to the gun and back to the heater. Heat is supplied to pressure tanks by various means: steam jackets, electrically heated oil or water baths, electric immersion heaters, electrically heated strips on the outside, etc. Each of these methods has its advantages and its shortcomings with regard to cost, complexity and safety.

Heated tanks are efficient and simple in construction, but though well insulated and jacketed, are not electrically explosion proof. They are often recommended for solid material which must be melted and kept hot before it will flow through a hose.

Since a practical heated fluid hose which will maintain 165°F. or more has not as yet become available, it is common practice to use a small circulating pump to keep the hot material moving to the gun and back for reheating.

More recently separate electrically heated units for low pressure equipment have been developed which are less costly and approved for use in explosive atmospheres: but a new problem has arisen, maintenance costs. A number of the newer units have been constructed with paint tubing formed in a spiral and cast into an aluminum block along with electric heating coil and a thermostat. The trouble with this is that it is almost impossible to clean dried, charred paint from the tubing — it's just not accessible. Even better are the simple flat heaters with a removable helix (scroll) around which the paint flows and which may be easily cleaned.

Some of the heater manufacturers have attempted to replace the pressure tank with gear pumps. But since gear pumps depend on a close tolerance between gears for their efficiency, they soon develop headaches from the abrasive effect of the pigment in most paints.

If the heater must be placed more than 10 feet from the spray gun it is usually desirable to use a circulating pump to keep the hot paint available at the gun all the time. However, no trouble may be expected from a centrifugal circulating pump because there are no close tolerances and the significant paint pressure is supplied by the old reliable pressure tank.

In painting operations where heat is not available in winter (i.e., in steel fabrication and drum plants), the use of a heater is frequently ideal, because not only is the need to heat the paint prior to use eliminated, but also, much thinner is saved.

Hot spray may be used to advantage with most organic finishing materials, among which are lacquers, enamels, vinyls, and many varnishes. It is particularly helpful with strippable materials where heavy film thickness are required.

On the other hand, hot spray, whether for low pressure or high pressure equipment, should not be used with materials which readily polymerize with heat. Certain varnishes fall into this group.

Actually, heat is of only small advantage when used with any material the viscosity of which is not reduced by heat, such as water paints. For best results it is a good idea to consult the paint supplier if there is any question about the material. Often material can be formulated to give best results with heat.

Electropolishing Copper, Brass and Aluminum

By K. F. Lorking, *Cambridge, England*

Copper and Brass

JACQUET[1] introduced baths for the electropolishing of copper and brass using electrolytes containing ortho- and pyro-phosphoric acids. He found that aqueous solutions of metaphosphoric acid alone were unsuitable for electropolishing these metals.

In order to investigate the polishing conditions of these baths more closely, Hull cell experiments were carried out. These showed[2] that the optimum acid concentrations for macro- and micropolishing of copper in orthophosphoric acid solutions was of the order of 600 g./l. Higher acid concentrations gave better micropolishing properties but inferior macropolishing powers. In an attempt to improve the bath characteristics it was decided to investigate the effect of increasing the viscosity. The results of experiments on copper and brass are reported below.

COPPER:

Results from Hull cell tests, using copper anodes, showed that of the chemicals glycerol, glycol, sucrose, metaphosphoric acid and copper phosphate added to phosphoric acid (s.g. 1.293), to increase the solution viscosity, and hence improve the polishing powers of the bath, metaphosphoric acid produced the optimum effect.

It was found that the optimum bath composition was 150 ml. orthophosphoric acid (s.g. 1.293), and 20 g. metaphosphoric acid, with a current density of 200-500 mA per square inch. Addition of metaphosphoric acid was found to improve the micropolishing charteristics of the bath, reduce the size of the mounds produced on the surface during slow oxygen evolution, and reduce the area covered by these mounds. The general appearance of the polished surface was greatly improved.

BRASS:

When the electrolytic polishing of brass (63.4% copper) was investigated using the Hull cell, it was found that the addition of metaphosphoric acid to orthophosphoric acid improved both the macro and micropolishing capacity of the bath.

The optimum bath composition was 150 ml. orthophosphoric (s.g. 1.293) and 30 g. metaphosphoric acid. The current density was 500-600 mA per square inch.

75-S Type Aluminum-Zinc-Magnesium Alloy

Baths generally used for electropolishing aluminum alloys were found to produce cleaning and etching only on 75-S alloy specimens,[3] except for a phosphoric acid-chromic acid bath developed by Jacquet.[4] Some difficulty was also experienced in chemical polishing these alloys, so that an investigation of both types of polishing was carried out.

CHEMICAL POLISHING:

The surface finish produced on specimens of 75-S alloy was investigated in the various baths used for the chemical polishing of aluminum and its alloys. Most of the baths[5] did not brighten the surface, except for one[6] used for industrial chemical polishing of aluminum and its alloys, which produced some brightening. The polish produced on the alloy specimens was improved when the water was omitted from this bath, whose final composition was:

Orthophosphoric acid (s.g. 1.75)	75 ml.
Nitric acid	3 ml.
Glacial acetic acid	12 ml.

The bath was heated to 116°C., and the specimens were agitated to remove bubbles. After polishing, specimens were washed in hot water, rinsed in alcohol and dried in a stream of hot air.

ELECTROLYTIC POLISHING:

The bath designed for chemical polishing this alloy was adapted for use in electrolytic polishing. An excellent finish was obtained when the nitric acid was left out, and some water was added. The bath was found to have a high throwing power, and excellent macro and micropolishing capabilities. The appearance of the surface was spoiled in some areas by pitting caused by bubbles sticking to the surface, but this was prevented by rotating the specimens.

It was necessary to wash the specimen in alcohol or acetone immediately the current was disconnected to

(*Continued on page* 68)

Flexibility and Labor Reduction Feature New Plating Department

By Donald A. Sigman, *Solbern Mfg. Corp., Brooklyn, N. Y.*

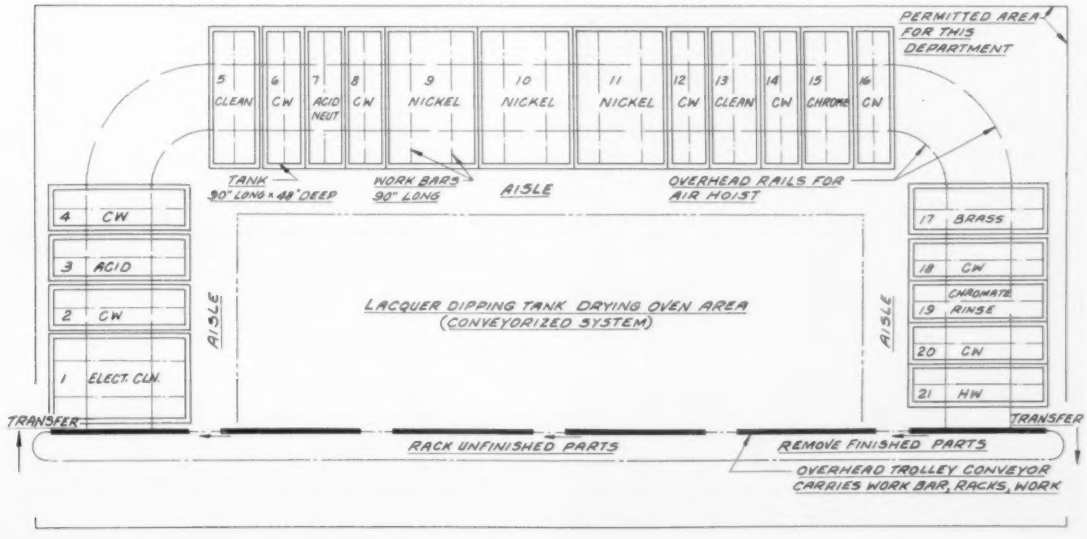
IN the course of a recent modernization program, *Kings Electro Plating Co.*, a large New York City job-shop, had to weigh the operational economy of fully-automatic equipment against the flexibility of semi-automatic operation. The wide variance in type of work and lot size, which was characteristic of the firm's output, indicated the advisability of the latter system of production, and a number of possibilities were then investigated.

Final choice was an interesting and efficient manually-operated double trolley, air-hoist transfer arrangement of sufficient flexibility to permit extremely varied size of work, since racking could be horizontal as well as vertical. The new set-up permits a number of finishes to be applied singly or in combination, employing a common cleaning cycle; then any selected plating combination, followed by a common drying cycle. The operator can bypass tanks in order to select the proper plating solution.

A very important advantage of this system is that the timers controlling the plating and cleaning times may be changed independently of each other, as required by the type and condition of the work. This permits the operator to apply more or less thickness of deposit without affecting cleaning time. He does not run the risk of undercleaning or of etching due to prolonged cleaning and pickling. Similarly, the operator may alter his cleaning time, if necessary, without changing the plating rates. In the event of solution trouble in one of the nickel tanks, production does not cease.

The semi-automatic system, costing only 25 per cent more, requires only one-sixth the labor of hand operation. In addition, it provides a "pace-setter," typical of timed operations. The finish is better controlled and the entire operation is cleaner, dryer and less sloppy than hand plating. In addition, material is saved, due to controlled withdrawal rate from the tanks.

The system at Kings Electro Plating utilizes 3 air-operated hoists and 3 operators. One operator transfers the work through the cleaning cycle. The second removes the work from the last cleaning rinse and transfers it through the nickel plating sequence into a rinse tank. The third transfers it through the brass or chromium plate into the rinsing and drying cycle. Tanks are located in an open "U" shape, with the longer dimensions parallel and approximately 3" apart. The hoist operator walks in front of the ends of the tanks with his hoist; thus, aisle and floor



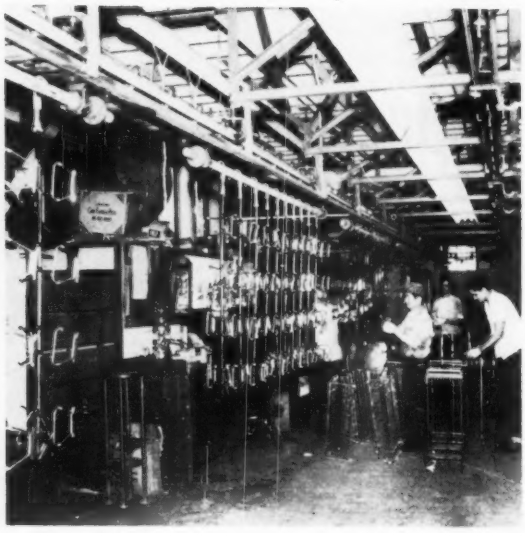


Fig. 1. Overhead conveyor racking line. Work bars carrying racks are convenient and accessible. Tables at right are ready to be hung on work bars in place of small work just completed.

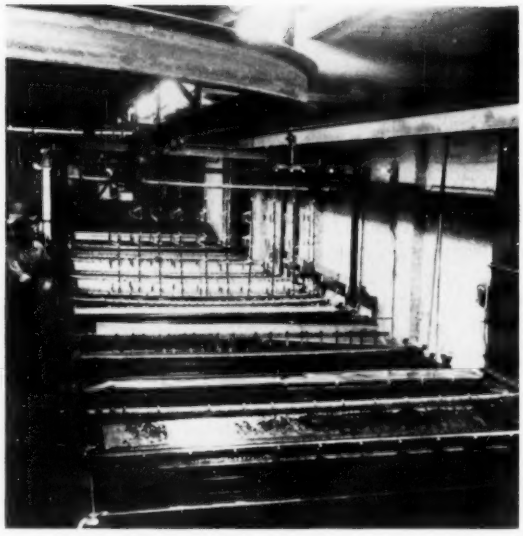


Fig. 2. View showing parallel arrangement of tanks with hoist and overhead double rails.

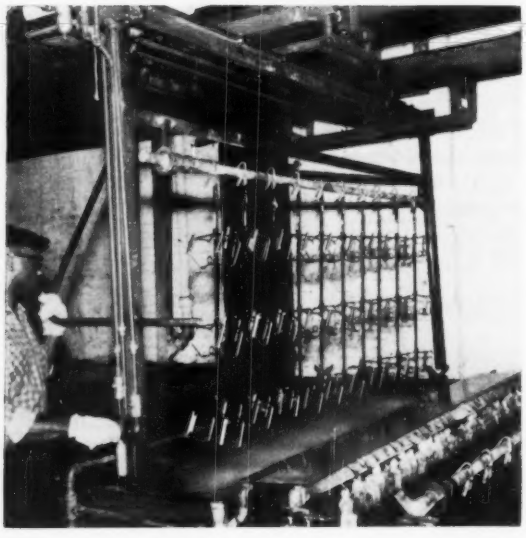


Fig. 3. Operator using air operated hoist to lower work into rinse tank. Hoist carries 9' 0" work bar and 10 racks. Note sprays at top of tank.

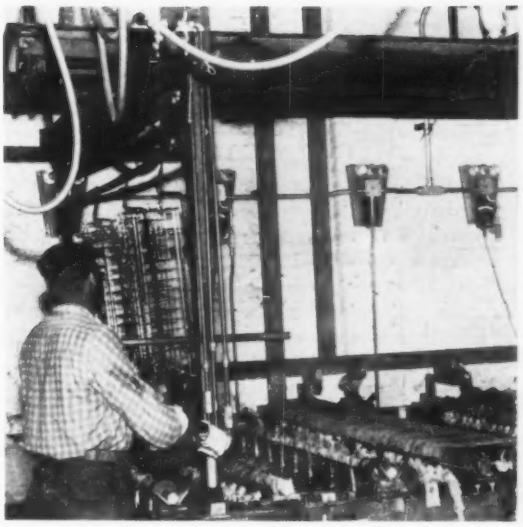


Fig. 4. Lights on wall signal operator when to remove work from tank. Other lights inform him which tanks are open and which are in operation. Note close spacing of tanks.

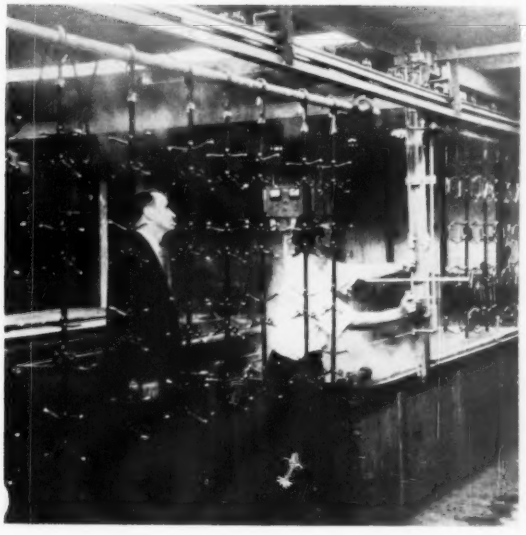


Fig. 5. Operator is shown transferring 10 racks of finished work from final hot rinse to overhead conveyor for removal of work and re-racking.

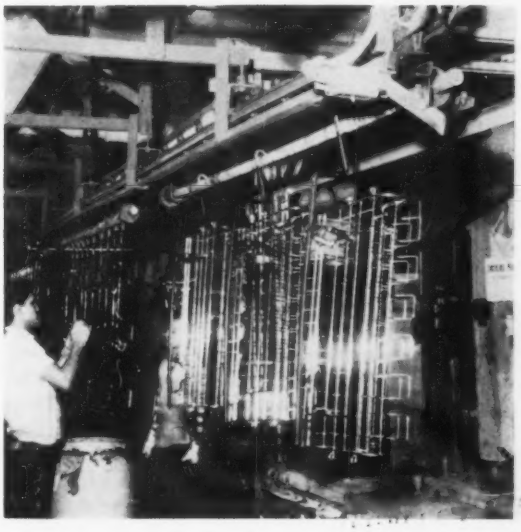


Fig. 6. Work bar with large chrome shoe rack follows plating racks with brass plated trunk handles. Work has been transferred from last hot rinse to overhead conveyor for removal of work and racking of new work.

space are saved, since no aisles are required between tanks. The tanks are 9′ long and 4′ deep, those with single work bars being 34″ wide and those with double work bars 70″ wide.

The hoist enables the operator to lift a fully loaded work bar, which carries the racks through the process. Thus, an operator can handle hundreds of pounds instead of a maximum of about 10 pounds in each hand. Furthermore, since the work bar itself is removed with the work, it permits the full width of the tank to be utilized. For a given size tank, work can be much larger than for hand plating since the maximum dimensions of the racked parts are no longer limited by the clearance between a fixed work bar and the anode rods or the sides of the tank.

The plating and cleaning times are controlled by the use of timers with three lights. A white light over a tank indicates the tank is open. Setting the work bar on the tank saddles automatically starts the timer and switches on a green light. At the end of the timed interval, a red light goes on to tell the operator to remove the work. The timed interval for any tank may be varied as desired without changing the time of the other cycles.

The installation is used primarily for a 12 minute nickel plate. There are three nickel tanks with double work bars, allowing room for a total of six bars. At any one time, five bars are in the tanks and one bar is in the process of transfer. The work bars are 9′ long and carry a varying number of racks. One work bar completes the full cycle every 2-2/5 minutes, so that the system plates about 250 racks per hour when ten racks are treated on a bar.

An added feature is that the work bars with racks and completed work are transferred directly to a trolley conveyor after the drying cycle. Racks are carried past the rackers for removal of plated work and racking of new work. The racks themselves are not removed from the work bar unless new work requires different racks. The work bar with newly loaded racks proceeds on the trolley conveyor to the cleaning section of the plating area where the hoist operator transfers the work bar with its loaded racks and starts the cleaning cycle.

The Plating Cycle

The following cycle is employed:

1. Electroclean. 2 bar tank operated anodic at 12 oz./gal., 170-180°F., and 3,000 amperes.
2. Cold Rinse.
3. Acid Dip. 10% sulfuric acid, at 110°F.
4. Cold Rinse.
5. Electroclean. Same as Step 1.
6. Cold Rinse.
7. Neutralize. 5% sulfuric acid, at room temperature.
8. Cold Rinse.
9. Nickel Plate. 2 bar tank operated with proprietary bright nickel solution at 2,000 amperes.
10. Same as 9.
11. Same as 9.
12. Cold Rinse.
13. Electroclean.
14. Cold Rinse.
15. Chromium Plate. 33 oz. solution at 105°F.
16. Cold Rinse.
17. Brass Plate. Standard brass solution.
18. Cold Rinse.
19. Chrome Rinse.
20. Cold Rinse.
21. Hot Rinse.

ELECTROPOLISHING COPPER, BRASS AND ALUMINUM

(*Continued from page* 64)

prevent etching. The specimen was then washed in hot water, rinsed in alcohol and dried.

The optimum conditions for polishing are:

Orthophosphoric acid (s.g. 1.75)	70 ml.
Glacial acetic acid	72 ml.
Water	8 ml.

Temperature: 70-75°C. (Pitting occurs at higher temperatures).

Current density: 0.5-0.8 amp./in.^{2} (Raising the current density causes rapid heating of the bath).

The bath cannot be used to electropolish specimens having freshly ground surface or heavy pitting will occur. This pitting can be prevented by heating the specimen in a chromate bath to build up the protective power of the oxide film sufficiently to prevent the electropolishing electrolyte from dissolving the film before the cell current is switched on. One such bath containing 35 ml orthophosphoric acid (s.g. 1.75) and 20 g. CrO_3 per liter[3] gave a satisfactory oxide film when the abraded specimen was immersed for 30 minutes.

It was found that Jacquet's bath[4] was easier to handle than the orthophosphoric-glacial acetic bath described above, in that the oxide film formed on the alloy surface was not so readily dissolved in Jacquet's electrolyte.

An interesting point regarding the composition of these baths is that by the addition of an oxidizing agent to the glacial acetic — orthophosphoric acid bath used for electropolishing, a successful chemical polishing bath is obtained.

Acknowledgements

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FINISHING POINTERS

Strike Cleaning

By J. B. Mohler

PROPER and adequate cleaning is recommended as the first step for an electroplating process. It is not a question of whether or not cleaning is required, but rather what type of cleaning should be used. Cleaning may be by mechanical means, soak, power washer, solvent, or electrolytic. Perhaps several cleaning steps should be used. For heavy dirt and oil, a solvent step followed by an alkaline cleaner is often necessary. If rust or scale is present, pickling or de-scaling become a part of the cleaning cycle. For relatively clean work, such as freshly ground or polished steel, a single cleaning step will suffice. In any case, cleaning must be sufficiently good to allow for variations in the amount of dirt, scale, and organic matter that may be present on the work.

A cleaning cycle is selected to take care of the maximum amount of expected surface contamination. This is an obvious necessity to assure continued satisfactory cleaning. Unfortunately, one cannot anticipate all variations of the dirty surface. Occasionally, work comes to the plating department that does not respond to the normal cleaning cycle. Trouble appears in the form of spotty work. Cleaning tests show that the work can be plated satisfactorily if it is cleaned. However, it takes excessive or unusual cleaning to establish this fact. This is an old story that has happened many times.

The best answer to this problem is to find the source of the contamination. Often, it is due to a change in the production practice for manufacturing the part. If there are a number of steps in producing the part prior to plating, then it is only a matter of time until a change will be made at some step. Oil and heat are a villainous combination that often cause this trouble. A new cutting oil introduced at a machining step has proved to be troublesome. Or a faster cut that generates more heat, without changing the oil, can cause the same trouble. In one case, a very difficult problem was produced on oil quenched steel parts that were later subjected to a drawing heat. The problem was solved by cleaning the parts prior to drawing. At times, the source of the trouble cannot be located; at other times, it cannot be changed economically.

When parts cannot be cleaned by a standard practice they can often be cleaned satisfactorily by introducing an extra cleaning step. For hand processing this is not too serious, since an extra step will not add excessively to the cost. For automatic large scale processing, an extra step that is not automatic becomes too costly. Nevertheless, precleaning is not uncommon prior to racking for automatic plating. Two common precleaning methods for large scale work are: basket vapor degreasing and machine power washing.

For some fixed plating cycles it is possible to increase the cleaning efficiency within the time and space limitations of the process. This has been done in some instances by adding cleaning properties to a striking step, or by adding striking properties to a cleaning step. This could be called "strike-cleaning" in either case.

An electrolytic cleaner is a hot alkaline bath in which the work functions as one of the electrodes. A strike bath is a low efficiency plating bath in which metal and hydrogen gas are deposited simultaneously on the cathode. An alkaline strike bath, such as silver cyanide, copper cyanide, or alkaline tin, will clean quite effectively. If such a bath must function as a strike, the requirements for the strike must be kept in mind.[1] The properties of an electrolytic cleaner can be added to the properties of a strike by operating the bath hot and in the presence of alkaline chemicals with good detergent properties. This has been done by adding trisodium phosphate to copper strikes and by operating such strikes at 160-180°F.

Silver strikes function well as strike baths when operated cold; consequently, there is very little experience with hot silver strike baths. However, it is known that copper strikes can be substituted for silver strikes and these can be operated at relatively high temperatures.

An alkaline tin bath is a relatively good strike-cleaner when operated at a low metal concentration. The bath must be hot in order to deposit tin and it is normally quite alkaline. Good deposits are easily obtained and the alkalinity can be increased by adding excess sodium hydroxide. Such an addition will decrease the cathode efficiency, but a low cathode efficiency is desired for good striking.

Sodium stannate can be added to a standard electrolytic alkaline cleaner to produce a strike cleaner. It has been found that cleaning efficiency has been increased where this was done and a difficult cleaning problem existed.

A low-cathode-efficiency alkaline plating bath is often useful to promote coverage for subsequent plating. The covering power of an alkaline strike is excellent and apparently, in some cases, presents a clean uniform metal surface for subsequent plating.

A low efficiency metal plating bath can protect metal areas as they are plated. The Bullard-Dunn process is a good example of this sort of protective action.[2] This bath is a sulfuric acid bath, containing a small concentration of tin, and used for descaling steel. The work is made the cathode at high current density. The scale is removed essentially by pickling in the warm acid bath. As scale is removed, tin is deposited and protects the exposed metal from further attack.

Baths that act as a combination cleaner and strike or as a pickle and strike are not common. However, they have been used successfully to overcome specific problems. They have been most successful where processing steps were limited to the tanks available, as in an automatic plating machine. Where space and time are limited it is quite logical to try to make one bath do the work of two.

References

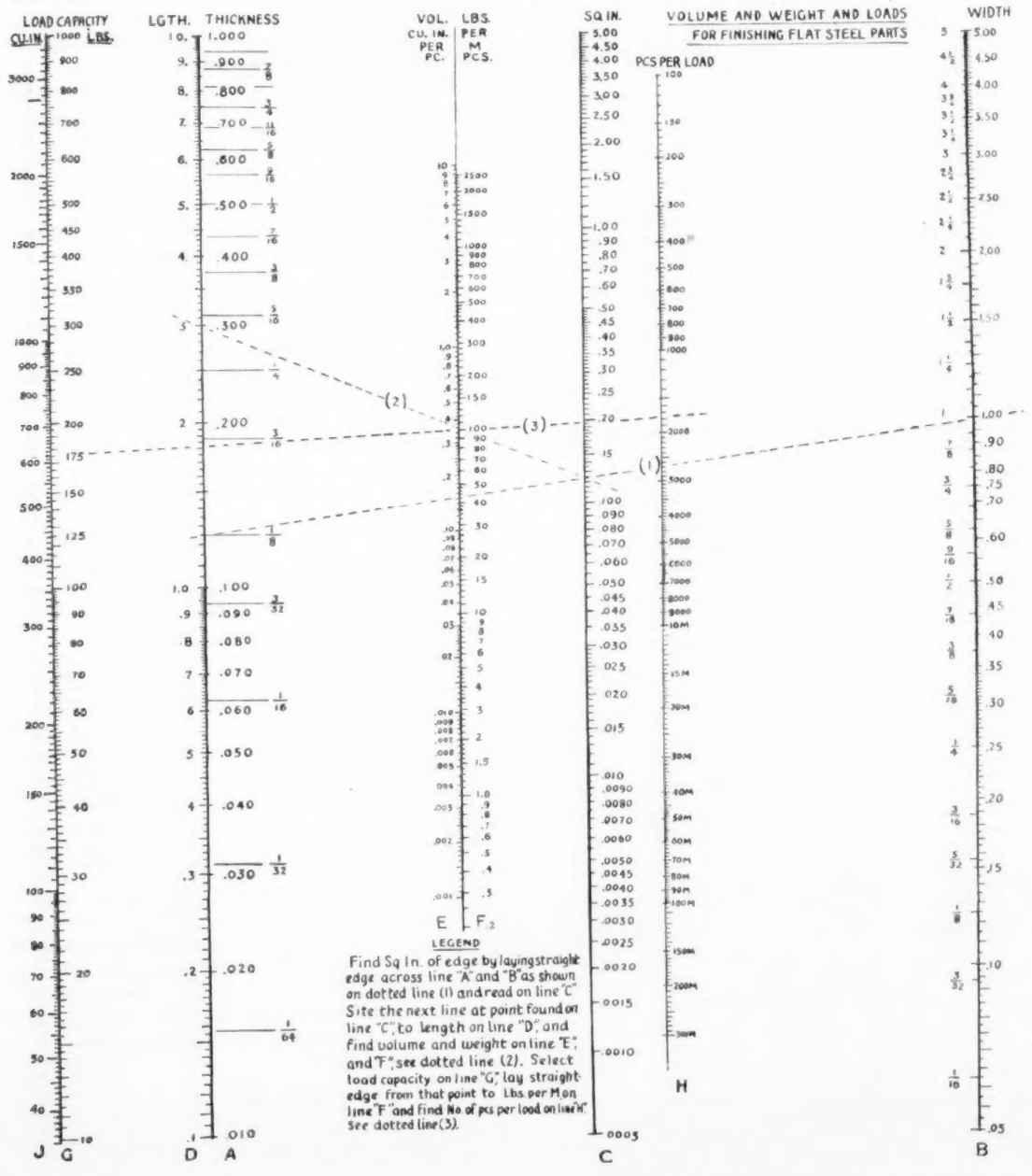
1. Metal Finishing, March 1951, p. 57.
2. Simonds and Bregman, Finishing Metal Products, p. 89, McGraw-Hill Book Co., 1946.

Measuring Loads of Solid Flat Steel Parts

By George C. Field, *Cutler-Hammer, Inc., Milwaukee, Wis.*

TO cover a variety of applications, an alignment chart is especially useful for estimating loads for many kinds of plating, tumbling, acid dipping, passivating, and rotary sand blasting. Approximate weights and volume can be determined for solid rectangular and square, steel parts. Another one of its many uses is that of estimating loads for heat treating.

An important feature that facilitates its use, is the combination of fraction and decimal equivalents, as seen on lines "A" and "B" of the nomograph shown.



By these, it is possible to select dimensions; thickness at "A", width at "B", length at "D", and find the weight in pounds per 1000 pieces on line "F", as directed in the legend of the chart.

Using the Chart

When preparing to use the chart, it is a good policy to jot down the dimensions of thickness, width, and length on a piece of paper. The chart will function properly, only if used the way it is constructed. For example: we have the following load to calculate for a piece of steel ⅛ inch thick by 1 inch wide and 3 inches long. The lines A, B, C, and D must be followed in their order. Read ⅛″ thickness on line "A", 1″ width on line "B", as illustrated by dotted line (1). The result is square inches of the edge, as found on line "C". Then from that point on line "C", extend dotted line (2) to line "D" at the point of 3 inches and the resulting weight appears where it intersects line "F" at 100 lbs.

Having the pounds for 1000 pieces, we may want to find the load for a barrel with capacity of 175 pounds, so we project the line from that point on "G" through 100 as shown by dotted line (3) to a point on line "H", and read the pieces per load as 1750.

The load capacities for various functions is usually determined by shop practice guided by desire for safety, functional efficiency, practical handling ability, and avoidance of wear and tear on the equipment. Those who desire to use this chart should learn what the load capacities are in their particular shop and then mark them on the lines "G" or "J". While the chart shows volume in cubic inches in relation to weight, it must be realized that loads cannot be pre-determined by volume without considering losses of space due to pieces falling at random and to the shape of the pieces. If experience has taught the factors or percentages of space to allow, then this chart can be used by taking box dimensions and adjusting the reading of dimensions when calculating.

The chart is designed primarily for measuring loads by weight and it has many uses, approximating the practical needs where weight is the limiting factor. This chart can be adapted to uses beyond which it is designed. For instance, should it be desired to measure the weight or loads for round steel pins or shafts up to 1″ in diameter on this chart it can be done. The diameter is to be squared by using the thickness scale "A", times the width scale "B" and reading the square inches on the line "C". Follow the same process as would be done with a solid square steel pin. For example, a square pin ½″ x ½″ x 4″ long would show a weight of approximately 283 lbs. It can be converted to the weight of round pins by multiplying it by the factor .7854. The above 283 lbs. then becomes 222.5 lbs. Then, if pieces per load is desired, use the adjusted figure on the "F" scale with the straight edge held at the load capacity line "G", read the pieces per load on line "H".

The values on these scales can be read more accurately if a thin piece of transparent plastic is used for a straight edge. The scope of size may be increased by using a dimension relatively smaller in decimals and increasing the answer accordingly, for weight and decreasing loads. In other words, the decimal points of the chart are normally fixed to which the loads and weight correspond, and the scope of the chart may be increased by adjusting the decimal points, if it is done relatively.

ELECTROPLATERS TO MEET IN CINCINNATI

MAY 18-22, 1958

Plans are well underway for this Convention and a brief synopsis of the program follows:

Sunday — May 18

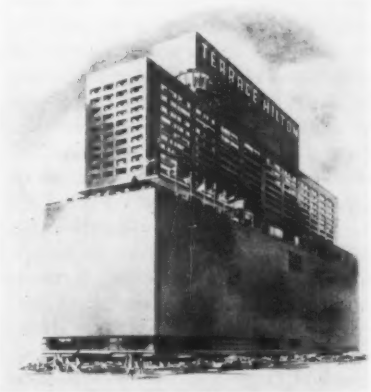
A.M. & P.M. — Registration
Evening — Get Together Party

Monday — May 19

A.M. — Business Meeting
P.M. — Educational Session
Evening — M.F.S.A. "Open House"

Tuesday — May 20

A.M. — Educational Session
P.M. — M.F.S.A. Golf Tournament and Outing at Coney Island Park



TERRACE HILTON HOTEL

Wednesday — May 21

A.M. — Technical Session
P.M. — Technical Session
Evening — Floor Show and Dance

Thursday — May 22

A.M. — Technical Session
P.M. — Annual Business Meeting
Evening — Annual Banquet and Dance

For hotel reservations, write Cincinnati Convention and Visitors' Bureau, Inc., Union Central Building, Cincinnati 2, Ohio, telephone Parkway 1-3728.

Convention headquarters will be at the Sheraton-Gibson Hotel.

Science for Electroplaters

34. Cyanide Removal by Ion Exchange

By L. Serota

A METHOD which shows promise for the removal of the cyanide ion and the metal cyanide complexes from waste, especially dilute solutions, is the ion exchange process. Several factors have contributed to the increasing attractiveness of this method: the greater capacity and chemical stability, such as resistance towards oxidizing and reducing agents as well as high temperature, of recently developed resins; re-use of the effluent for rinsing, or the substitution of such regained demineralized or high purity water for tap water; recovery of cyanide in large or small scale operations; and the relative economy of this method. This advantage increases with increasing dilution, as a result of the concentration of the components, when compared to such treatments as chemical, precipitation, electrolysis, or evaporation.

This process is especially adaptable to removal of small quantities of cyanide by recycling, as in areas with limited water supply, or in cases where this low concentration of cyanide must be removed from final rinses or effluents of a process. Tests indicate that the effluents from a catonic-anionic exchange resin system for copper, zinc, and silver cyanide solutions can contain less than 0.1 ppm. of total cyanide, CN, and less than 0.02 ppm. of metal ions. Under suitable conditions, continued investigation may reveal methods for virtually complete removal of cyanide by ion exchange. It is well to note that ion exchange serves to concentrate the waste but that it is not a method of disposal.

By regeneration, the cyanide and metal ion concentrations recovered in one investigation were increased to amounts varying between 5,000 and 30,000 ppm. which, with necessary additions of cyanide reagents, may become suitable for reuse as plating solutions. In evaluating this method, however, consideration must be given to cost of equipment, resins, and regenerating chemicals, as well as the fact that unusual selectivity towards certain ions in ion exchange resins is not as yet entirely feasible. *T. E. Kressman* notes that resins generally are not specific for a particular metal ion and that even preferential removal, within limits, does not permit complete separation but, instead, results in exhaustion of the resin. *N. K. Hiester* and *R. C. Phillips* referred to the fact that the usual ion exchange resins exhibit moderate selectivity for ions, but that resins with chelating properties show specific attraction for cobalt, iron and copper ions. *R. Kunin* and *R. J. Meyers* in their text, *Ion Exchange Resins*, state that resin exhibiting the most satisfactory property of selectivity for transition elements — a property not characteristic of simple ion exchange operations, was prepared from m-phenylene diglycine, formaldehyde and a cross linking agent.

Mechanism of Ion Exchange

Essentially, ion exchange represents a reversible exchange between ions in a solid (resin) and in the solution, without materially changing the structure of the solid. A cation or anion resin is a high molecular weight polymeric substance (electrolyte) in which ionizable (active) groups are attached by chemical bonds to a cross-linked molecular network. The cross-linking accounts for the insolubility of the resin particles and the consequent reduction of swelling in solution. The principal ion-active groups to which cations owe their high capacity are the sulfonic, $-SO_3H$, and carboxylic, $-COOH$, groups. The characteristic acidic properties of the cation resins are attributed to these functional groups. The sulfonic group is a strong acid group, and high capacity sulfonated (styrene) resins are most widely used. The carboxylic type is not as strongly acidic and finds widest application in the exchange of large organic ions. *R. Kunin* and *R. E. Barry* found that the rate of exchange for a carboxylic cation exchange resin required 7 days for equilibrium attainment as compared with 2 minutes for a sulfonic cation exchange resin.

Regeneration of cation exchangers, when exhausted or saturated with metal ions, is generally attained by an acid, sulfuric acid being most commonly used for such treatment. The equation representing this interchange with sodium chloride, NaCl, can be expressed as:

$$NaCl + R{\cdot}SO_3H \underset{\text{regeneration or elution}}{\overset{\text{saturation}}{\rightleftharpoons}} R{\cdot}SO_3Na + HCl.$$

The effluent from the cation exchange resin will yield, therefore, according to this equation, a dilute hydrochloric acid solution.

Anion Exchange

Anionic resins are synthetic amines in which primary, secondary, or tertiary (amine) groups, attached to a high polymer, produce an insoluble, weakly basic ion possessing a high capacity for mineral acids and a very low capacity for weak acids. An amine is a derivative of ammonia (NH_3) where one or more hydrogens are replaced by a radical. A primary amine would have the general formula $R{\cdot}NH_2$. This class of compounds is more basic than ammonia; it is soluble in water and combines with acids. Ethyl amine, $C_2H_5{\cdot}NH_2$ is an example. A secondary amine has the general formula $R_2{\cdot}NH$. Dimethylamine $(CH_3)_2NH$ is an example. Trimethylamine $(CH_3)_3N$ is a tertiary amine.

Strongly basic anion exchangers containing quaternary ammonium groups are related to ammonium hydroxide and are made insoluble by being attached to a high polymer. The substitution may be represented by the following equation: $NH_4OH \rightarrow N(CH_3)_4OH$, tetramethyl ammonium hydroxide. These strongly basic resins have a high capacity for weak acids such as hydrocyanic acid and silicic acid as well as mineral acids. The hydroxyl ion in such resins may be exchanged for other anions in the treated solution; thus, $HCl + R_4N{\cdot}OH \rightarrow R_4N{\cdot}Cl + H_2O$ (acid removed). Regeneration of the weakly basic

resins is effected by using sodium carbonate or ammonium hydroxide, and generation of the strongly basic resins by using sodium hydroxide: $R_4N{\cdot}Cl + NaOH \rightarrow R_4N{\cdot}OH + NaCl$.

The introduction of strongly basic anion exchangers is a comparatively recent development, in which the quaternary ammonium (amine) groups, which serve as the functional groups, are attached to (as in one type) a styrene-divinylbenzene copolymer. These polyamine resins have been shown to function as true anion exchangers. As with strong bases, these strongly basic quaternary amine anion resins are completely ionized, hence ion exchange is not dependent upon the pH of the waste or solution.

Application

An early report relating to the use of ion exchange in the removal of cyanide, as a complex ion, was produced by *S. Sussman* and associates. Iron as the ferrocyanide was adsorbed on an ion exchange resin chloride, which, when followed by regeneration with sodium hydroxide, resulted in the recovery of 97 per cent of the ferrocyanide. The results served, significantly, as an example of the practicability of cyanide compound removal, in this instance a complex anion, by the ion exchange method.

The removal of cyanide from wastes by ion exchange was the basis of investigation by *D. E. Bloodgood* and *F. J. Losson* and reported at the Industrial Waste Conference, Purdue University, 1947. A series of tests was described for the removal of the cyanide ion from a KCN solution containing 15-24 ppm. as KCN, pH range 6.1 to 6.4. The use of an anion exchanger alone proved ineffective. A second test included an acid-regenerated cation exchanger and an alkaline-regenerator anion exchanger in series. The rate of flow of the influent, which was a KCN solution in distilled water, pH 7.4 to 9.4, containing 23.4-24.8 ppm. as KCN, was regulated at about 50 ml. per min. The solution reacted with the cation resin bed, after which it flowed through the anion resin bed. The potassium ion was exchanged for the hydrogen ion on the cation resin, giving an effluent consisting mainly of hydrocyanic acid which was adsorbed by the anion resin. Results of a final test run by this series flow treatment procedure, with a solution pH 6.8 and containing 20.4-24.7 ppm. as KCN, showed that the cyanide concentration in the effluent from the anion resin was reduced to about 0.2 ppm. as KCN. Recovery of the cyanide was not investigated in this report.

There has been a paucity of literature relating to the ion exchange method for removing simple and complex cyanides from solution. The increasing developments in the preparation of effective anion exchange resins, plus the adaptability of this process for the recovery of cyanides, whether for large or small scale operation, resulted in the sponsoring of the research project for this study by the *American Electroplaters' Society*.

The significant methods considered in this project for obtaining an effluent in which the cyanide concentration would be below the limits of toxicity were: (1) a single anion exchanger in which the metallic cyanide complex (anion) may be exchanged for the hydroxyl ion to produce an effluent containing sodium hydroxide; (2) a series arrangement (dual bed) consisting of a hydrogen type cation resin in series with a hydroxyl strong base anion exchanger. In such a scheme, the sodium (or potassium) ion of a cyanide solution will be replaced by the hydrogen ion in the cation resin, resulting in an acid, low pH condition, which may cause some of the metal complex cyanides to decompose, yielding metallic ions and hydrocyanic acid. The metallic ion will be adsorbed by the cation, leaving the hydrocyanic acid, HCN, and water, formed by the hydroxyl ion from the alkaline cyanide solution uniting with the hydrogen ion in the cation ion exchange resin. In the subsequent flow through the anion exchanger, the cyanide ion is adsorbed, in addition to any complex metal cyanide which was not decomposed by the acid. The effluent would, therefore, consist of (demineralized) water, pH about 7 or neutral. The complex cyanides of zinc, silver, and cadmium are most easily decomposed. In cases where the carbonate ion is present, carbonic acid, H_2CO_3, will form in the cation exchanger, which will require for its removal a strongly basic anion exchange in addition to hydrocyanic acid. The carbonic acid may also be removed from the effluent by degassing. Fig. 153 is a schematic arrangement for this dual bed exchange system, with the various ions indicated as well as the exhaustion and regeneration cycles.

Plating solutions of copper and zinc

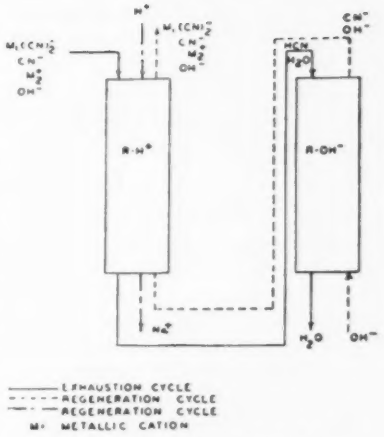


Fig. 153. Dual Bed Ion Exchange Scheme.

cyanide were prepared for this investigation, and a silver plating solution was obtained from a Connecticut plant. The composition of each bath was as follows: (a) zinc cyanide 60 g./l., sodium cyanide 41 g./l., caustic soda 79 g./l.; (b) cuprous cyanide 45 g./l., sodium cyanide 68 g./l., sodium carbonate 30 g./l.; (c) silver 31.8 g./l., free cyanide (CN) 17.7 g./l., total cyanide (CN) 34.8 g./l. plus brightener. For experimental study the solutions were diluted to concentrations ranging from 20 ppm. to 1000 ppm. of total cyanide. The resins used were strong and weak acid cation exchangers and strong and weak base type anion exchange resins.

Zinc Plating Solution:

Results obtained in a zinc plating solution with a total cyanide concentration of 104 ppm., pH 11.1, showed that the strong basic (polystyrene quaternary amine) anion was more effective than the weak base (polyamine type) anion resin in the removal of cyanide and zincate ion. For example, the anion exchange effluent for the strong (quaternary) base contained less than 0.5 ppm. CN and less than 2 ppm. zinc and showed 0.601 pound CN per cubic foot of resin before break-through, whereas the experimental run with the weak base anion resin was not satisfactory for the removal of anions. This was evident by leakage occurring throughout the run, with the anion exchange effluent giving a total CN concentration of 4.15 ppm. and less than 0.04 pound of CN per cubic foot of resin before break through. The term breakthrough refers to the presence of unadsorbed ions, such as those being re-

moved in the solution, leaving an ion exchange bed. It also indicates the need for regeneration of the resin. The authors attribute this poor exchange to the fact that the pH of the solutions was above the limit of effective operation.

The strong base anion resin was regenerated with a ten per cent, by weight, sodium hydroxide solution, with poor results recorded. Kunin and Meyers indicate that a ten per cent concentration is best for regeneration. Regeneration of the weak base, because of the poor results in anion removal, was not tried.

In another series of runs, a dual bed cationic-anionic (series) arrangement was used for comparison with the single ion exchange bed method. Both strong and weak acid hydrogen type cation resins and strong and weak base hydroxyl type anion resins were included in this study. Best results were obtained with a zinc cyanide solution, 200 ppm. total CN, when the resins used in the dual bed were the strong acid (polystyrene sulfonic acid type) cationic, strong base (quaternary amine or polyamine) anionic type. The anion exchange effluent in such cases contained 0.03 ppm. total CN, and an average of 0.85 pound of CN per cubic foot of resin was obtained before break-through. When a weak base anion resin was substituted, results were similar to the single bed anion exchanger, the anion effluent containing again 4.15 ppm. total CN. Of the strong base anion resins tried, the polystyrene quaternary amine type and the quaternary ammonium groups that are attached to a styrene divinylbenzine copolymer matrix showed the most effective regenerating qualities (10 per cent NaOH used), whereas, a somewhat more strongly basic anion resin of the polystyrene quaternary amine type rated poorly by comparison.

Copper Plating Solution:

A single bed anion exchange system was tried for treatment of the copper cyanide solution before testing by the dual bed resin method. This choice was based upon the fact that (acid) decomposition of the copper cyanide complex ion produces a very stable cuprous cyanide which, because of its neutral state following cationic treatment, would not be exchanged by the anion resin, thus leaking through. With solutions containing a total cyanide concentration of 200 ppm., results indicated that removal of both free and complex cyanide ions using a strong anion base, carbonate type resin, was quite complete. Analysis of the anion effluent showed less than 0.1 ppm. total CN. Recovery, however, when a sodium carbonate solution (2.77 N) was used as the regenerant, was reported poor, with no copper and only low concentrations of free cyanide resulting. To prove that a hydroxyl ion regenerant (as NaOH) was more effective than the carbonate ion for the removal of the cyanide ion, a sodium cyanide-sodium carbonate solution, 200 ppm. total CN, in which the ratio of carbonate to total cyanide was the same as that of copper plating solution, was subjected to the single anion exchange treatment. Although removal was good, the anion exchange effluent showing 0.1 ppm. total CN, regeneration with 2.77 N sodium carbonate was poor, as in the previous run, compared to the results obtained when 10 per cent sodium hydroxide was used as the regenerant. Here, too, copper cyanide complex was not removed.

When the anionic resin was regenerated first with sodium cyanide for the copper exchange, followed by sodium hydroxide, removal of the copper cyanide complex was reported very good. The sodium hydroxide was used to replace the cyanide in the resin. The removal of the complex copper cyanide by the cyanide ion is attributed to the formation in concentrated solution of a different type of cyanide complex. Excess cyanide, according to *S. Senderoff*, in a copper cyanide plating solution, lowers cathode efficiency and raises polarization. Results would seem to indicate that the effect of higher cyanide concentration is to cause the shift from the tricyano complex ion $Cu(CN)_3^=$, which is considered largely present in copper complex ion $Cu(CN)_2^-$, to the tetracyano complex ion $Cu(CN)_4^{\equiv}$.

When the dual bed ion exchange method was employed, with the copper plating solution, (1000 ppm. total CN, pH 10.9) flowing through the same type strong acid cation and strongly basic anion exchanger used in the previous runs, very good results were reported. The anion exchange effluent contained less than 3 ppm. copper and less than 0.1 ppm. total CN. Regeneration with sodium cyanide gave excellent results, with one run showing 1.99 pounds copper regenerated per cubic foot of resin, compared to 0.66 pound of copper regenerated per cubic foot of resin when the single anion exchange system was used. Weakly acid cations and weakly basic anion exchangers were unsatisfactory. Excessive leak-through occurred, with one run for the dual bed system recording 316 ppm. total copper in the anion exchange effluent.

Silver Plating Solution:

Emphasis on test runs for the silver plating solutions, 1000 ppm. total CN, pH 10.9, was placed upon the use of a strongly acid hydrogen type cation only, because recovery of hydrogen cyanide, HCN, by the anion exchanger would be similar to that obtained in the zinc and copper plating solutions. The concentration of silver in the cation exchange effluent in all the runs was consistently less than 0.1 ppm., indicating complete decomposition of the silver cyanide complex ion into silver ions and hydrogen cyanide. Two pounds or more of silver per cubic foot of resin was retained before the break-through point was reached. Regeneration with ammonium hydroxide, which forms a soluble ammonium silver cyanide complex, was considered good with a silver concentration in the cation effluent of 1.04 pounds per cubic foot of resin (about a 50 per cent recovery) for one of the runs. When, in one of the regeneration tests, a sodium hydroxide-sodium cyanide solution was used on a batchwise scale, 97 per cent of the silver was recovered. With sodium hydroxide as the regenerant no silver was recovered, thereby indicating that the exchanged (replaced) silver ion was dissolved by the cyanide ion.

An indication of the mechanism of silver regeneration was provided by the appearance of a white band which progressed downward in the resin and increased in depth during the flow through of the solution. Silver leak-through occurred when this white band reached the bottom. The view expressed is that the silver ion is adsorbed as well as exchanged in the cation exchanger. Such adsorbed silver could possibly form insoluble silver cyanide with the free cyanide, or the silver cyanide could possibly form in the hydrogen exchange process. The downward motion of the white band results from dissolution of the silver cyanide, owing to the presence of free cyanide and the high pH of the solution. Ammonium hydroxide will also

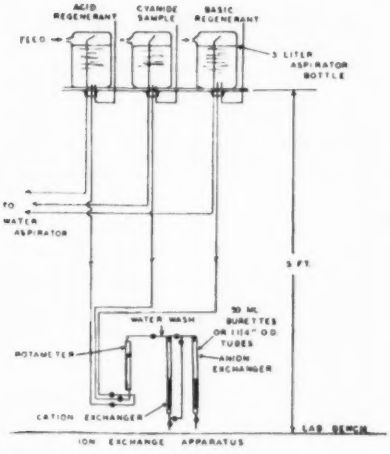


Fig. 154. Ion Exchange Apparatus.

form the soluble ammonium silver cyanide complex with the insoluble silver cyanide. Evidence of the absorption theory is supported by the experimental results obtained by *W. K. Lowen* and associates. The results indicate that equivalence of exchange (of ions) does not occur. Instead, differences between decrease in concentration of an ion in solution and increase in concentration of another is attributed to the absorption of water by the resin, and when silver ions are present, adsorption of silver ion (from the solution) occurs in addition to water absorption and simple ion exchange.

Fig. 154 represents the ion exchange apparatus used for this investigation. Screw clamps regulate the gravity flow of solutions, with a rotameter in the system for measuring the rate of flow. Lines for backwashing the resin are not shown in the diagram. pH determinations were made with pH papers for approximate values and glass electrode pH meter for accurate measurements.

Determination of cyanides was made by the titrametric method with KI and p-dimethylaminobenzalrhodanine as indicators. Zinc was determined by volumetric analysis. Standard potassium ferrocyanide was added in excess, then back titrated with a standard zinc sulfate solution. The external indicator was p-ethyoxychrysoidin. Copper and silver were determined by volumetric methods as detailed in the METAL FINISHING GUIDEBOOK. The iodometric titration was used for copper and the potassium thiocyanate procedure for silver.

Traces were determined colorimetrically with the following reagents: dithizone for zinc; tetraethylenepentamine for copper, and p-dimethylaminobenzalrhodanine (after removal of cyanide) for silver.

On the basis of the experimental evidence gained in this research project, the authors advance the following suggestions for an ion exchange process:

1. The use of a dual bed cationic-anionic exchange treatment for removal of cyanides and metals from dilute cyanide solution.

2. Recovery of cyanide and metal in concentrated form by regeneration by the flow of an alkali metal solution through the cation-anion resins in series.

3. Rinsing of the ion exchangers with effluent until the concentration of the cyanide in rinses is less than 0.1 ppm. total CN.

4. The use of acid for regenerating the cation exchanger and continued rinsing until the pH value exceeds 5.0.

5. Substitution, where feasible, of the treated effluent for water in plating cycles.

6. If sodium hydroxide concentration in regenerated solution is too high, it can be changed to the carbonate by addition, in stoichiometric quantities, of sodium bicarbonate.

SHOP PROBLEMS

BARREL FINISHING — POLISHING AND BUFFING
CLEANING — ANODIZING — ELECTROPLATING
RUSTPROOFING — LACQUERING AND ENAMELING

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Silk Screening Resists

Question: We are presently silk screening degreased aluminum parts which must be caustic etched to remove bending marks and scratches. Since the surfaces to be marked are sometimes bent several inches below the level of the adjacent surfaces (a "staircase" bending pattern), the only practical means of silk screening such parts seems to be that of printing before the part is bent. This means that the ink used must be able to withstand the etching process — a five minute dip in 5% NaOH at 180° F. followed by a cold water rinse and immersion in a cold 40% nitric acid bath for 1½ minutes. We have thus far been unable to find an ink which will adhere successfully under these conditions.

Assuming that we must continue use of our present etching process, can you suggest either a suitable ink (and the manufacturer), or some other means of solving the problem?

K. K. C.

Answer: A number of acid and alkali silk screening resists are on the market which may serve to eliminate your problem. Some are based on vinyl dispersion media while others on asphaltum bases. In some cases an air drying type will show sufficient adhesion; heat-curing types may, however, be required for the severe conditions to which your parts are subjected.

It is recommended that you investigate silk screening procedures which will allow resist application *after* the bending process. Our feeling is that the coating is, to some extent, being distorted during the bending operation, permitting uplifting of the edges, with subsequent penetration of etching solution.

Bright Dipping Zinc

Question: Will you kindly give me your best instructions regarding the following problems.

1. Bright dip solutions for zinc plated articles. I am not satisfied with nitric acid and those solutions published in the Electroplating Engineering Handbook.

2. Passivating dips for nickel plated articles to increase the rust resistance.

L. H. C.

Answer: The bright dips referred to are standard formulas and the only alternative is to use a proprietary material which may give better results.

To obtain best results with a bright dip, it is important that the plating solution be free from contamination with metals such as copper and lead. Use of a suitable zinc bath brightening agent will also result in improved luster in the subsequent bright dip.

Nickel does not need passivating for corrosion resistance, as it is a corrosion resistant metal. Rust resistance is a function of porosity of the nickel deposit. Maintaining a filtered solution and increasing the deposit thickness will improve the results.

Wood in Iron Baths

Question: We wish to use wooden frames and members that will be submerged in an electrolytic iron solution. Where shall we find information concerning the use of wood in these solutions?

C. R. H.

Answer: We know of no source of information concerning the use of wood in electrolytic iron solutions. Cypress is usually considered the most suitable wood for submersion in solutions and should be satisfactory for the sulfate bath. However, we doubt whether it will stand up at all in the hot chloride bath.

In either case, it is important to soak out the tannins and other organics before use.

Calculations for Chromic Anodize

Question: I would appreciate a more simple explanation of the following statements on chromic anodizing, page 432 of the Platers Guidebook, 1951 edition.

"As the pH rises still further, requiring the addition of more chromic acid, the concentration will increase above ten per cent. When this condition is reached, it is necessary to draw off some of the solution, replacing it with water and fresh chromic acid. The amount of draw-off may be judged by comparison of the pH and degrees Baume with the curve, which gives the total chromic acid concentration."

As an example: our chromic anodize tank contains 700 gals. To start a new bath 300 lbs. of chromic acid are used (5% by weight). My last analysis showed a Baume of 13 and pH of 1.1.

From the above information could you explain to me how to figure the amount of draw-off and chromic acid addition to bring this bath to the proper operating condition?

A. G.

Answer: If you examine the chart you will note that a pH of 1.1 and a Baume of 13.0 is equivalent to a chromic acid content of 106 g./l. The amount of draw-off and replacement is calculated by trial and error. For example, as a first trial, if we should remove 16 g./l. of solution and replace with water, the concentration would then be 90 g./l., but the pH will remain practically the same. From the graph we find that the Baume of the diluted solution would be 11.1 degrees. The addition of 10 g./l. chromic acid would raise the concentration to the required maximum of 100 g./l. and, also from the graph, the additional chromic acid would raise the Baume by 0.8 to a new

figure of 11.9. The pH corresponding to the modified solution would then be about 0.72, from the graph, which is below the maximum of 0.85 recommended.

We then try again, removing 11 g./l. instead of 16, which results in a concentration of 95 g./l. and a pH of 1.1, for which the Baume will be 11.7 from the graph. Adding 5 g./l. chromic acid will give us a concentration of 100 g./l. and a Baume of $11.7 + 0.4 = 12.1$, corresponding to a pH of exactly 0.85 from the graph. Therefore, we must remove $\frac{11}{106} \times 700 = 73$ gallons of solution and replace with water, after which we must add 5 g./l. of chromic acid, or 29 lbs. to the 700 gal. tank.

It is not necessary to calculate, as above, until the exact pH of 0.85 is obtained since a figure slightly lower or higher would still be sufficiently good for practical operation.

Coating Build-up on Gauges

Question: During the manufacturing process we size and gage certain spring members with steel pins. In most cases, the spring materials are plated with cadmium, silver, solder or any of a number of commonly used plating materials. It has been observed that after these steel pins have been inserted and withdrawn a number of times, the plating material will build up on the pins giving us a variety of problems.

Our firm would certainly appreciate it if you could inform us of some solutions that would remove various plating materials and yet not react with steel, or prescribe certain solutions that would prevent the plating from building up in the first place.

C. J. L.

Answer: Suitable stripping methods for the various deposited metals will be found in any recent edition of the METAL FINISHING GUIDEBOOK. Chromium plating the pins would be most effective in minimizing build-up due to adhesion of the soft deposits on the springs.

Nickel Sulfamate Bath

Question: We are interested in obtaining from you through METAL FINISHING'S Reader Service, information on the sulfamate bath for electrodepositing nickel. We would appreciate details on both make-up and operating conditions. If you have any information, will you please forward same or advise where such information may be obtained.

A. C. S.

Answer: A number of nickel sulfamate baths have been suggested and a typical solution would consist of the following:

Nickel sulfamate ... 50-60 oz./gal.
Boric acid ... 4-5 "
pH: 3.0-5.0 colorimetric
Temp.: 100-140 deg. F.
Voltage: 4-5
Current: 20-140 amp./sq. ft.

A wetting agent may be added to control pitting and, with agitation, higher current densities may be obtained. It has been reported that addition of 5 oz./gal. nickel chloride will permit use of electrolytic nickel as anodes.

Preventing "White Rust" on Zinc

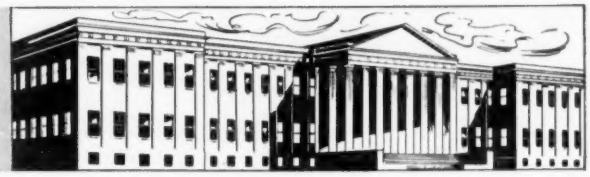
Question: Can you advise as to the best method of most effectively preventing white rust on galvanized iron for the longest period of time?

M. S.

Answer: The best chemical dip method for preventing white rust on galvanized iron is a chromate conversion coating. A list of suppliers of such coating processes will be found on page 624 of the 1958 edition of the Metal Finishing Guidebook.

Patents

RECENTLY GRANTED PATENTS IN THE METAL FINISHING FIELD



Coating Composition

U. S. Patent 2,798,861. *July* 9, 1957. *G. H. Segall and J. L. Cameron, assignors to Canadian Industries* (1954) *Ltd.*

A coating composition comprising essentially a linear thermoplastic copolymer of from 15 to 80 parts of styrene and from 15 to 80 parts of a lower alkyl ester of acrylic acid and from 5 to 10 parts of an acid selected from the group consisting of acrylic and methacrylic acids, the total parts being 100, in admixture with from 15% to 55%, by weight of said copolymer, of a low molecular weight polymeric condensation product of diphenylolpropane with epichlorohydrin, said condensation product having an epoxide content of at least 7.5% by weight and a melting point not exceeding 75° C. and a Gardner viscosity not exceeding 1.65 poises as a 40% solution in ethylene glycol monobutyl ether, and from 0.5% to 2.0%, by weight of said copolymer and condensation product jointly, of a quaternary ammonium hydroxide having at least one alkyl group of from 12 to 18 carbon atoms attached to its nitrogen atom.

Paint Applying Device

U. S. Patent 2,799,884. *July* 23, 1957. *G. L. Bedford.*

A paint applying device comprising a handle having a front end, a pair of generally L-shaped parts comprising angularly directed diverging feet and substantially parallel legs, said legs being secured to said front end of said handle, said legs including front portions, said front portions being separable by bending to assume various positions, said feet being movable toward and from each other with said front portions of said legs, said feet forming axles, said feet lying in substantially the same plane generally at right angles to the handle, and paint applying rollers journaled upon said feet and extending for substantially the entire lengths of said feet and bodily movable therewith when said feet are moved toward and from each other.

Apparatus for Internally Spraying Pipes

U. S. Patent 2,800,875. *July* 30, 1957. *R. B. Jewell, assignor to Silas Mason Co.*

Apparatus for internally spraying pipes.

Paint Can Attachment

U. S. Patent 2,801,762. *Aug.* 6, 1957. *W. A. Atherton.*

In combination with a paint can having an opening at the top thereof and having a circular upwardly facing groove in the opening-defining portions thereof, a continuously formed ring-shaped member superimposed upon said opening-defining portions of said paint can and having outer annular portions and a circular depending rib extending downwardly into and frictionally engaging said groove in tight-fitting relation.

Paint Preheaters

U. S. Patent 2,802,089. *Aug.* 6, 1957. *L. Beck.*

A paint preheater of the character described, comprising an elongated casing having a long tubular portion defining a bore, the bore being open at the lower end, the upper end of the bore being closed by an enlarged integral head having an externally threaded upper portion, a sleeve coupled with the threaded portion and extending above the head to form a chamber spaced from said bore, a cover detachable with said sleeve and forming a closure for said chamber, the casing being enclosed in an insulation jacket, means arranged in the casing for heating the tubular portion thereof, an elongated paint supply tube arranged centrally within and extending longitudinally of said bore for supply of paint to the upper closed end of said bore, the paint passing downwardly through the bore around said supply tube, means for moving the paint in a spiral fashion to the lower discharge end of the bore, a tubular discharge coupled with the lower end of the casing and extending into the lower portion of the bore for discharging heated paint therefrom, and said first named means comprising an electric heating element embedded in said casing and having ends extending through the head into the upper chamber of said casing.

Electrostatic Coating Device

U. S. Patent 2,802,446. *Aug.* 13, 1957. *M. Utterback, assignor to Binks Mfg. Co.*

A device for electrostatic spraying an article with coating material comprising a frame, a plurality of wires tensioned between spaced portions of said frame, said wires being spaced laterally from each other a predetermined distance, said plurality of wires being spaced laterally a greater predetermined distance from an article to be coated and with their lengths substantially parallel to said article, means for depositing a flowable coating material upon said wires to distribute said coating material upon the surfaces of said wires and bridging said wires with a film of coating material, a source of voltage one side of which is connected to said wires to charge said wires at a predetermined polarity and the other side of which is connected to the article to be sprayed to charge the same at an opposite polarity from the charge on said wires to establish an electric field between said wires and the article to be coated whereby the coating material carried by said wires is atomized and propelled in atomized condition into impinging contact with the article to be coated.

Paint Mixing Apparatus

U. S. Patent 2,802,649. *Aug.* 13, 1957. *C. O. Stockton, assignor to Zac-Lac Paint & Lacquer Corp.*

A mixing machine for stirring the contents of a plurality of containers

comprising a plurality of spaced horizontally disposed shelves, supporting elements depending from all of said shelves, a bottommost shelf disposed beneath said other shelves, means for removably coupling the free ends of said supporting elements on one of said horizontally disposed shelves to the next lower of said shelves, a drive means mounted on one of said shelves, tandem arranged couplings extending between said shelves for simultaneous driving by said drive means, guide means on each of said shelves below the topmost shelf for selectively receiving a plurality of containers and to accurately locate said containers in juxtaposition along each of said shelves, vertical shafts depending from said shelves, each of said shafts being so located as to be centered above one of said guides, coupling means mounted on the lower end of each of said shafts, and means to simultaneously rotate all of said shafts carried by one shelf from the coupling carried by that shelf.

Paint Remover Composition

U. S. Patent 2,802,790. *Aug.* 13, 1957. *S. Z. Avedikian.*

A homogeneous creamy paint remover composition consisting of 730 grams methylene chloride, 80 grams methanol, 50 grams naphtha (flash pt. 105° F.), 25 grams methyl cellulose, 40 grams ammonium salt of sulfated oil, 20 grams paraffin (M. P. 124° to 145° F.), 200 grams 28 percent aqua ammonia, and 100 grams water.

Freeze Resistant Aqueous Polymer Containing Paint

U. S. Patent 2,802,799. *Aug.* 13, 1957. *P. H. Johnson, assignor to The Firestone Tire & Rubber Co.*

An improved freeze-stable water dispersion paint consisting essentially of a synthetic polymer latex, a polyalkylene polyamine and water-dispersed paint pigment, said latex being produced by aqueous emulsion copolymerization of a minor proportion of conjugated diene with a major proportion of polymerizable monoethylenically unsaturated compound, in the presence of at least about 1.0 part by weight of a soluble salt of persulfuric acid and up to about 0.4 part by weight, of initial emulsifier, both per 100 parts by weight of monomers; and said paint containing additional surface active stabilizing emulsifying agent added after 50% polymerization conversion.

Electrostatic Spraying

U. S. Patent 2,803,496. *Aug.* 20, 1957. *E. M. Ransburg, assignor to Ransburg Electro-Coating Corp.*

An electrostatic atomizing unit comprising: a single-fluid atomizing head having an elongated orifice adapted to have liquid flowed therethrough at relatively low pressure for electrostatic atomization therefrom, said elongated orifice having a width of only a few thousandths of an inch and a length many times its width; a cleaner member; means for mounting the cleaner member in said head with a portion movable in said elongated orifice, said portion being relatively small and not appreciably projecting therefrom; drive means for continuously reciprocating said cleaner member along said elongated orifice during atomization therefrom, and means for supplying power to said drive means with the power supplying means being of electrically insulating material.

Electrocleaning of Vanadium

U. S. Patent 2,803,596. *Aug.* 20, 1957. *C. M. Brown, assignor to Union Carbide Corp.*

The method of electrically removing the contaminated, high oxygen-containing surface layer of vanadium metal which comprises making the metal to be treated the anode of an electrolytic cell having an aqueous electrolyte consisting of ions selected from the group consisting of the alkali metal carbonates and alkali metal bicarbonates, applying a direct current of pre-determined voltage and continuing electrolytic action until the brittle layer of the vanadium metal has been removed.

Gas Plating

U. S. Patent 2,804,397. *Aug.* 27, 1957. *R. B. Goodman, assignor to Paul J. Marks.*

The process for making an aluminum metal coated material which comprises reacting together lithium aluminum hydride and aluminum chloride in stoichiometric amounts to obtain a reactant mass containing aluminum hydride and lithium chloride as a precipitate, separating the lithium chloride precipitate from said mass, applying the aluminum hydride containing filtrate to a traveling web of material in an inert atmosphere, and subjecting said web of material in an evacuated atmosphere to a temperature for decomposing said aluminum hydride to cause deposition of the metal aluminum in the form of a coating on said material while withdrawing the liberated hydrogen gas.

Bright Cadmium Bath

U. S. Patent 2,803,593. *Aug.* 20, 1957. *L. B. High and W. E. Hague, assignors to Udylite Research Corp.*

An aqueous cyanide-cadmium plating bath containing at least about 0.01 gram/liter of at least one additive selected from the group consisting of monosulfated monoleate esters, disulfated monoleate esters, di-sulfated dioleate esters and sulfated oleic acid.

Paintbrush Holder and Scraper

U. S. Patent 2,803,374. *Aug.* 20, 1957, *C. Chappman.*

For use with a cylindrical container having on its open upper end an overhanging rim formation extending over said upper end and a groove in the upper face of said formation, a paintbrush holder comprising a handle, and a fork member adjacent one end of said handle and having its intermediate portion connected to said handle one end with its legs arranged longitudinally of and facing away from said handle, a scraper blade extending between the free ends of said legs and having each of its ends connected to the adjacent leg.

Heat-Resistant Finish Compositions and Vehicles Therefor

U. S. Patent 2,803,610. *Aug.* 20, 1957. *B. H. Kress, assignor to Allied Chemical & Dye Corp.*

A heat-resistant finish composition comprising an inorganic, heat-resistant leafing-type pigment dispersed in a solution, in a volatile, inert organic solvent having a boiling point below 200° C. and of the group consisting of aliphatic and aromatic solvents of (1) a rosin ester of a polyhydric alcohol, and (2) an acidic organosilanol having a molecular weight below 3000 wherein there are at least 2.5 silicon-bonded oxygen atoms per silicon atom, including at least 0.15 silicon-bonded oxygen atoms per silicon atom that are contained in hydroxyl groups; at least 70 percent of the silicon atoms have hydrocarbon substituents attached there-

to; and at least one-third of said hydrocarbon substituents are aryl groups; the weight ratio of (1) to (2) being from 4:1 to 1:4.

Spray and Blow Gun

U. S. Patent 2,804,343. *Aug.* 27, 1957. *M. V. Friedell, assignor to C. A. Norgren Co.*

A spray and blow gun having a handle portion and a barrel portion, a bore extending longitudinally through the barrel portion, a discharge nozzle at one end of the barrel portion, an air delivery passage extending through the bore and opening at one end in the discharge nozzle, a tubular member slidably mounted in the bore and extending through the air delivery passage, said tubular member providing a liquid delivery passage opening at one end in the discharge nozzle and a valve seat at the other end of the liquid delivery passage, a liquid supply passage opening into the bore adjacent said seat, a liquid valve member mounted in the end of the bore adjacent said seat, means biasing the tubular member toward said valve member to engage the seat with the valve member, an air valve controlling the air delivery passage, and a manually operable trigger on the gun connected to open the air valve upon initial movement thereof and then to slide the tubular member to unseat the liquid valve member upon further movement thereof.

Oscillating Sanding Machines

U. S. Patent 2,804,723. *Sept.* 3, 1957. *A. F. Sweeney.*

A sanding machine comprising a plurality of abrading drums, fine means for controlling and positioning the elevation of said drums, a movable endless bed, a chassis for said endless bed, a plurality of vertical shafts adjustably engaging said chassis, gears at the lower ends of each of said shafts, a separate gear on a horizontal shaft meshing with each of said first mentioned gears, a transmission system for synchronously rotating said horizontal shafts whereby the said chassis is raised and lowered, means for rotating said drums, means for oscillating said drums and means for moving said endless bed.

Backstand Idler

U. S. Patent 2,804,726. *Sept.* 3, 1957. *G. W. Johnson, assignor to Fenlind Engineering Co.*

A backstand comprising a base, an idler pulley having belt also trained thereon, an L-shaped bracket carrying a horizontal arbor on its vertical leg supporting said pulley, said bracket being pivotally mounted by its horizontal arm on said base on a substantially horizontal axis spaced laterally from said vertical leg and in a vertical plane passing through the middle of said pulley, and an adjustable length support for the bracket rigidly connecting the base and bracket in radially spaced relation to said pivotal axis to tilt the pulley relative to the vertical plane and hold it in tilted position.

Abrasive Wheel

U. S. Patent 2,804,731. *Sept.* 3, 1957. *R. W. Bernstein and A. Block.*

An abrasive wheel comprising a circular member having a convex peripheral edge, and a plurality of segments coated with abrasive material on the outer sides thereof, said segments extending transversely across and closely adjacent to the peripheral edge of said circular member to provide a convex abrasive surface extending around the entire peripheral edge of said wheel.

Plated Refractory Metals

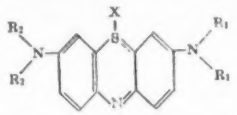
U. S. Patent 2,805,192. *Sept.* 3, 1957. *S. S. Brenner, assignor to General Electric Co.*

A method of providing an adherent metallic film on an article consisting of a metal selected from the group consisting of tungsten, molybdenum, tungsten base alloys and molybdenum base alloys comprising the steps of coating the surface of the article with a film of metallic copper and zinc by electrodeposition, annealing the coated article in a non-oxidizing atmosphere at about 900° to 1000°C. until the zinc has been substantially completely volatilized and electrodepositing a metallic ferromagnetic film over the dezincified residual copper film.

Bright Copper Plating

U. S. Patent 2,805,193. *Sept.* 3, 1957. *J. F. Beaver.*

In a method of electro-depositing copper from an aqueous copper sulfate-sulfuric acid bath, the step which comprises electrolyzing said aqueous acid copper bath containing a brightener compound which widens the range of solution concentration and electric current densities wherein plating can be conducted without encountering burning and forming treeing deposits, said brightener compound comprising a thiazine dye having the general structural formula

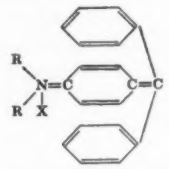


wherein R_1 and R_2 are radicals selected from the group consisting of hydrogen, methyl, ethyl, and phenyl radicals and X is an anion compatible in the plating bath, said brightener being present in a minor proportion.

Bright Copper Plating

U. S. Patent 2,805,194. *Sept.* 3, 1957. *J. F. Beaver and C. N. Abbott, assignors to The Dayton Bright Copper Co.*

In a method of electrodepositing copper from an aqueous copper sulfate-sulfuric acid bath, the step which comprises electrolyzing said aqueous acid copper bath containing a minor proportion of a brightener compound which widens the range of solution concentration and electric current densities wherein plating can be conducted without encountering burning and forming treeing deposits, said brightener compound comprising a triphenylmethane dye having the general structural formula:



wherein R is a radical selected from the group consisting of hydrogen, methyl, ethyl and phenyl radicals and X is an anion compatible in the plating bath.

Electrostatic Spray Painting Apparatus

U. S. Patent 2,805,642. *Sept.* 10, 1957. *C. D. Tuttle and G. T. Larsen, assignors to General Motors Corp.*

An electrostatic coating installation in which an electrically charged spray of coating material is electrostatically deposited on an article conveyed through a coating zone including a grounded conveyor and a source of potential one side of which is grounded and its other side adapted to be connected to said article when it is in the coating zone.

ABSTRACTS

Ultrasonic Metal Cleaning Practice

Dr. Froelich: Paper read to Ultrasonic Symposium, Germany, 1956.

As regards ultrasonic metal cleaning and degreasing, it can be said that the cavitation effect which is produced in the bath cleaning fluid with the application of the supersonic wave vibration in the bath, and which has been previously mentioned above, is of considerable significance to the metal cleaning processes conducted by these supersonic methods. Through this phenomonon, which is a feature of the supersonic cleaning bath, the cleaning fluid, together with the dirt particles, is explosively expelled from the surface pores of the part being cleaned. Locally occurring pressure build-up assist this work in ultrasonic cleaning.

Lead-Tin Alloy Plating from Fluoborate Baths

E. Raub and W. Blum: *Metalloberflaeche*. Vol. 9, No. 4, p. A 54.

Details are given of research conducted on the electrodeposition of lead-tin alloys rich in lead from fluoborate baths, and intended as a substitute for lead coatings obtained by the hot-dip process. The authors discuss the deposition potential with ratio to the current density for lead and tin in solution of the pure and mixed fluoborate.

Information is provided on the influence of metal concentration, temperature, and agitation on the lead-tin ratio in the deposit. Also discussed are the operative factors by which the tin content of the deposit can be increased, together with the influence of the oxidation of the stannous ions to tetravalent stannic ions on the lead-tin ratio.

Other points considered are supersaturation of the alloy produced; deposition conditions relative to the constitution of the alloy deposited; lattice constants of the lead-tin alloys obtained by fusion compared with those of the same alloys obtained by electroplating; details regarding the microhardness of the alloys deposited by electrolysis as a function of the tin content.

Spectral-Analytical Method for the Determination of Thickness of Plated Coatings

J. W. Zavod: Labor (Russia). Vol. 21, No. 3, p. 327.

The spectra of plated coatings show special characteristics such as changes in the intensity of the spectral lines, etc., which are of importance in ascertaining the correct exposure time and the time-point for the measurement of the thickness of plated coatings. Varying spectra are taken on a uniformly moved plate.

Numerous tests of electroplated coatings showed the dependency of the intensity of the spectral lines on the volatility of the metal coating. If the basis metal is more volatile than the plated coating, an intensity maximum is obtained whose extent depends on the thickness of the coating. For the measurement of monolayer coatings, the relationship of the intensities of spectral pairs can be utilized, one of which belongs to the basis metal while the other is characteristic for the coating metal.

Influence of Pickling Additions on Embrittlement

A. Keller: *Draht*, (Germany). Vol. 7, No. 2, p. 35.

As is known, inhibitors are added to the pickle bath to reduce attack of the acid on iron or steel or, in the ideal limiting case, to suppress it completely. It permits solution of the oxide compounds such as rust and scale, from the steel surface to proceed more or less undisturbed by the presence of the inhibitor additions.

The factors which govern the effectiveness of an inhibitor in the pickle bath are its temperature stability, acid concentration, and reducing influences. Particularly with high temperatures and high acid concentration as, for example, must be maintained in the operation of continuous pickling baths, the reducing influence is so great that most pickling inhibitors are completely destroyed after a short time.

The protective value of a pickling inhibitor is defined by the formula:

Restrictive value,

$$\% = 100 \times \frac{V_r - V_g}{V_r}$$ in which:

V_r = Iron loss in pure acid;

V_g = Iron loss in inhibited acid.

Tests conducted by the author showed that top grade commercial inhibitors available for sulfuric acid attain an effective value of 99% in a temperature range up to 100°C. For hydrochloric acid within a temperature range up to 40°-104°C., effective values of 97-99% were attained. Experience has shown that the following viewpoints are valid for pickling inhibitors:

1. No direct relationship exists between the restrictive action of an inhibitor on the metal attack and reduction of pickling embrittlement;

2. The effect of pickling inhibitors on pickling embrittlement is dependent to a great extent on the chemical composition of the material being pickled;

3. Inhibitors which reduce pickling embrittlement of acid-sensitive steels act in a similar manner with the usual, less sensitive steels.

Surface Cleaning Treatments for Steel for Subsequent Painting

O. Pfanhaeuser: *Beiztechnik*. Vol. 5, No. 2, p. 16.

In cases where it is required to prepare steel sheet for subsequent spray metalizing or painting, careful surface preparation is necessary. Dirt, grease and oils, dust, rust, and rolling scale, must all be carefully removed as, otherwise, the adhesion of the subsequent coating is not ensured. If the bright metal is present directly under the dirt or oil coating, the cleaning can be conducted simply with the known degreasing means. Other conditions occur with those surfaces where a scale or rust coating is present under the layer of dirt or grease.

Results are given of tests which comprised the treatment of the steel in various pickling baths, employing varying processing methods for the treatment such as immersion, brushing, etc.) These results are correlated with the service life of finishes applied on the surfaces treated in this manner.

Planned Layouts for Modern Plating Plants

C. Brusatori: *Galvano Tecnica* (Italy). Vol. 7, No. 1, p. 1

Details are given of a highly modern plating plant installed at Milan, Italy and the layout is discussed. Processing tanks are installed for cleaning, anodizing, copper, nickel and

chromium, etc. Modern equipment is installed for the mechanical preparation and plating in bulk.

The venting ducts for the individual tanks are arranged to pass downwards to the floor level and then under the floor, being completely covered over. The vapor condensates are separately detoxified and then passed to waste. A chain conveyor is arranged to run through the whole plant, feeding the individual baths. Precautions are taken so that no mis-direction can occur with the handling flow and processing arrangements.

A special coating system has been developed for the finishing treatments applied. Examples are given of the coating cards used with this system. Special coating cards have also been developed for the continuous treatment processes for the individual parts. These cards accompany every basket load and remain on the conveyor band during any material off-loadings for treatment until the finished, processed ware has again returned to storage control. Flow control cards serve to indicate at which points of the ware-handling conveyor system comprising the off-loading stations is further loading required.

Quality Requirements for Nickel Anodes

Metallic Bulletin (Holland). Vol. 5, No. 3, p. 55.

The relationships between the working conditions and the usage of nickel anodes in high speed and bright nickel baths are outlined.

In general, the following can be be given as the characteristics of a good nickel anode:

1. The anode must be clean and contain at least 99.6% nickel and cobalt. The maximum content of cobalt should be 1.5%.

2. The anode should not form too much mud and the slimes formed should not be too fine.

3. The anode must pass well and uniformly into solution; i.e. the surface of the anode must remain smooth and plane and, during dissolving into solution, no porous surface and structure should form on the anode.

4. The solution of the anode must proceed in such a manner that no large holes are formed and the anode does not fall apart during use.

5. The anodic current density must be as high as possible.

6. No abnormal polarization and no passivity should occur.

Determination of the Coating Thickness of Anodized Films on Aluminum Alloys

W. P. Borsow: *Iljina J. W. Isv. Akad. Nauuk* (Russia). Vol. 19, No. 2, p. 207.

The method is based on the introduction of the filler substance (potassium dichromate) into the pores of the anodized oxide coating, by which the porosity of the film is assumed as being homogeneous. Good agreement of the results is obtained with direct weighing determinations for the coating thickness.

The degree of porosity of the anodized coating can be determined from the relation of the intensity of the spectrum of the filler substance to the pore volumes, if the film thickness is known approximately.

Choice of Nickel Plating Baths

Metallic Bulletin (Holland). Vol. 5, No. 2, p. 29.

A problem which is imposed on the technician of every firm is the question of what type of mat or bright nickel bath is to be preferred for a definite plating requirement. Some factors are discussed, which have to be taken into consideration when making a choice of this kind.

The most important factors which must be studied in this connection are:

(a) The costs per 1,000 ampere-hours including the use of nickel salts for bath replenishing.

(b) The appearance of the coating, color, and depth of brilliance. Obviously such values cannot be expressed in terms of numerical data but these characteristics must be studied by means of test samples.

(c) The ductility and hardness of the coating. These values can be expressed numerically and can be evaluated statistically. However there is certain confusion here because such values are rendered in terms of different measuring systems:

(d) The leveling, throwing, and covering capacity of the deposit. A large amount of data have been published on these characteristics and detailed study is necessary to evaluate the best conditions for a particular purpose.

Comparison Between Hot-Dip Zinc and Zinc Plating

Metallic Bulletin, (Holland). Vol. 5, No. 12, p. 319.

There are distinctly separate fields of application for hot dip zinc and plated zinc products. This will depend to some extent on the type of product being treated and on the application visualized. For example, large constructional parts are not suitable for plating but are processed by the hot-dip method. On the other hand, there are parts such as small components which are most suitably zinc plated. Practically half of the world's production of zinc for 1955-56 was used for hot dip processing. Of the total use of zinc for surface treatment and protection, about 98% was used for hot dip and only 2% for the remaining zinc treatments.

The zinc-iron alloys which are formed in the hot-dip bath are not all brittle. The gamma coating is elastic, while the delta and zeta coatings are brittle. The solidified coating which is formed over this alloy layer has a high ductility. The bend characteristic of the total zinc coating is dependent, to a great degree, on the distribution of the alloy coatings and of the solidification coating so that general statements regarding the bend characteristics of the zinc coating are not possible.

As regards the corrosion resistance of the hot dip and plated zinc coatings, the following facts are known. The coating thicknesses which can be achieved by zinc plating are too small to ensure long term corrosion protection. Tests show that plated zinc coatings 20-25 microns in thickness show strong rust formation in an industrial atmoshpere after 1-2 years. On the other hand, hot-dip zinc coated parts showed rust only after 6-10 years equivalent exposure. The opinion is held that the same hot dip zinc coated parts, in a rural non-industrial atmosphere, would be resistant against rust for up to 40 years.

Hot-dip zinc coating of containers, pipelines, and other hollow parts is, admittedly, not a simple process. However, it is also not an unduly difficult procedure. The hot-dip zinc coating of tanks and hollow bodies is conducted on a large scale in practice.

The maintenance of definite coating thicknesses is of less significance with hot-dip zinc coating practice than with zinc plating practice. The achievement of a more exact coating thickness is not possible with the hot dip zinc coating, but it is also not necessary.

Without doubt, the appearance of a plated zinc coating, particularly a bright zinc coating, is better than that of a hot dip coating. With parts which are exposed to the atmosphere, appearance plays a minor role, however, as gray salts form on both.

Reactions Occurring During Electrolytic Reduction of Chromic Acid Containing Sulfuric Acid

M. Frey & C. A. Knorr: *Zeit Elektrochemie*, Vol. 60, #9-10, p. 1,093.

An investigation was made of the processes which are of importance to sulfate — chromium plating practice. As has been established by previous work on the subject, during electrolysis of pure chromic acid solutions, there is formed a coating on the cathode, presumably consisting of chromic chromate. This, to a great extent, prevents the reduction of the chromic acid, so that only hydrogen is generated.

Even with the addition of small amounts of foreign anions, other than sulfate, separation of metallic chromium and Cr^{+++} results, as well as hydrogen generation. The sulfate ions which are necessary as addition in small concentration to the chromic acid, it was found, are gradually carried over by the current passage to the cathode as a complex compound within the electrolyte. This complex can be analytically proved; it is not precipitated by barium chloride addition at room temperature.

The known foreign anion action, as is shown by the above work, occurs only with the free sulfate ions but not, however, with the combined sulfate ions. Thus, a chromic acid solution containing sulfuric acid which is separated from the anode by a diaphragm, gradually becomes ineffective as a result of the withdrawal of the free sulfate ions during electrolysis. Without the diaphragm, the sulfate compound which is formed at the cathode is again destroyed at a lead anode, so that the chromium deposition can take place for an unlimited period of time.

Coppering of Plastics Prior to Plating

Metallwarenind. und Galvanotechnik. Vol. 48, No. 4, p. 183.

A process is described by which plastic parts can be prepared for plating by a coppering procedure which is cheaper than the known silvering process usually applied. After the usual activation in a stannous chloride solution, the plastic parts are then dipped in a mixture consisting of the following:

a. Copper sulfate	5 g.
25% ammonia	20 c.c.
Water	200 c.c.
b. Rongalit salt	5 g.

The plastic parts activated in the stannous chloride solution can also be dipped in a 1% gold chloride solution and then coppered in the following solution:

Copper sulfate	4 g./l.
Caustic soda	7 "
Rochelle salt	15 "
Potassium sulfate	10 "
40% formaldehyde	15 "

After the precoppering, the copper film must be immediately strengthened by plating in a special bath, in which the parts must be placed with current on. Compositions of the special copper baths are:

1. Copper sulfate	50 g./l.
Caustic soda	45 "
Rochelle salt	150 "
Temperature: 25°C.	
Current density: 0.5 amp./sq. dm.	
2. Copper sulfate	25 g./l.
Rochelle salt	10 "
Triethanolamine	25 "
Current density: 0.5 amp./sq. dm.	

After 15 minutes in either of the above copper baths, the parts are then plated in a normal acid copper bath.

Anodic Oxidation of Copper and Its Alloys — Black Coloration

H. Edner: *Metallwarenind. und Galvanotechnik*. Vol. 48, No. 4, p. 157.

The well known ammonia bath which contains 200 grams of copper carbonate dissolved in 1 liter of concentrated ammonia will give very good blue-black to deep black colors on the brasses containing 58 to 63% copper. With higher copper contents, however, it is difficult to obtain a satisfactory color. It is also difficult to produce good colors on parts which have been given a bright dip. Only pure copper and high copper alloys can be treated with the persulfate bath. This bath is expensive to operate. The black dip bath using concentrated copper nitrate solution requires great experience to ensure success. All these chemical dip baths also suffer from the disadvantage that the copper oxide skin formed is very thin and will not stand handling.

These drawbacks are overcome by electrolytic oxidation of copper and its alloys. With this method, a brass with 63% copper can be given a satisfactory deep black color. Even on a brass with 58% copper, good colors can be achieved. The oxide coating has a film thickness of about 3 microns and the process can easily be applied in any ordinary plating shop. The only requirement is that a good rectifier is available with a regulation which is, as far as possible, stepless.

Pretreatment of the ware includes a good degreasing and then pickling in a solution of 200 g./l. sodium dichromate and 40 cc./l. sulfuric acid. The parts are then activated in a 25% hydrochloric acid solution.

The electrolyte used for the anodic oxidation consists of 150 g./l. caustic soda and 1 g./l. sodium or ammonium molybdate. The anodic oxidation is conducted at 80° to 100°C. according to three different processes:

1. At 0.2 amp./sq. dm. for 10 minutes.

2. At 0.5 amp./sq. dm. for 5 minutes, then 0.9 amp./sq. dm. for 2.5 minutes.

3. At 0.2 amp./sq. dm. for 45 seconds, then 0.4 amp./sq. dm. for 90 seconds, then 0.8 amp./sq. dm. for 135 seconds, then 1 amp./sq. dm. for 225 seconds.

The deepest black is produced by procedures 2 and 3. It has been found by test that the hydrochloric acid dip can be dispensed with. With a fresh bath the best oxide coatings are obtained at 90 to 100°C. With an aged electrolyte, a good coloration can be obtained at 65°C. It has been found also that good oxide coatings can be obtained even without the addition of molybdates to the electrolyte. The treatment is ended when a vigorous generation of oxygen occurs on the ware. The voltage range is 0-3 volts. Throwing power is good and deep hollow parts can be satisfactorily treated.

Recent Developments

NEW METHODS, MATERIALS AND EQUIPMENT
FOR THE METAL FINISHING INDUSTRIES

Lucite Barrel For Automatic Plating Machines

Frederic B. Stevens, Inc., Dept. MF, 1800 18th St., Detroit 16, Mich.

The above manufacturer has added a new and improved lucite cylinder to its line of barrels for use on Model "C" and "E" automatic barrel plating and processing machines. The cylinder has a number of important improvements, which are:

(1) An offset bottom that mixes the work better and substantially increases the number of different parts that can be successfully and economically plated in an automatic barrel machine.

(2) A heavy rib which goes completely across the bottom of the barrel. This rib increases the strength by adding to the stiffness and prevents the heat distortion encountered in other bottom designs.

(3) A heavy ring reinforcement at the mouth of the barrel to provide positive protection against mechanical damage while loading.

(4 Plastisol covered steel bales mounted between lucite guides. This means added strength and longer lifetime as the driving force that rotates the barrel is spread over the entire length.

(5) New lucite studs that hold the barrel to the bale. These eliminate the possibility of corrosion and loosening that comes with metal fastenings.

(6) More holes per square inch of barrel surface mean more current and more uniform plating.

56/Circle on Readers' Service Card

Graphite Plate Heater

National Carbon Co., Dept. MF, 30 East 42nd St., New York 17, N. Y.

A new Karbate impervious graphite plate type heat exchanger features an adjustable and removable elbow connection. Widely used in the plating and metal finishing industry, the style VHUS plate heater now provides complete flexibility of installation, and elbow replacements can be made in the field.

The removable, bolted elbow connection is stronger than the previous cemented construction, and can be swiveled to any desired angle, providing easy connection to the steam or water piping. Should the connection be damaged in service, it is no longer necessary to return the entire plate heater to the factory for elbow replacement.

The new construction simplifies shipping, as elbows and accessories can be packed separately, and the plate heaters shipped knocked down.

57/Circle on Readers' Service Card

Barrel and Box Grab

Palmer-Shile Co., Dept. MF, 12651 Mansfield, Detroit 27, Mich.

A new type barrel and box grab is designed for picking up any type of wood or steel barrel, box or container, from 40" diameter down to small nail keg size, without damaging or injuring interior or exterior of the container. It is available in two standard sizes, the half ton and one ton. Each grab is designed on the toggle principle, the heavier the load, the more rigidly it is held. Constructed of heavy welded steel chains, tongs are made of heavy steel bar stock. Weight is approximately 35 lbs.

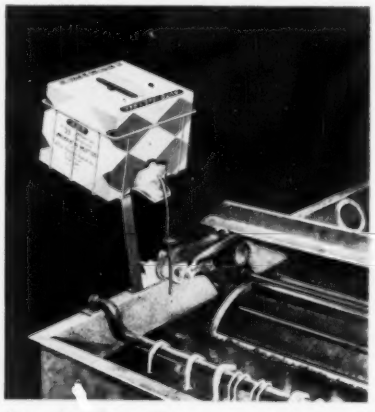
58/Circle on Readers' Service Card

Dispenser Carton for Brighteners

Allied Research Products, Inc., Dept. MF, 4004-06 E. Monument St., Baltimore 5, Md.

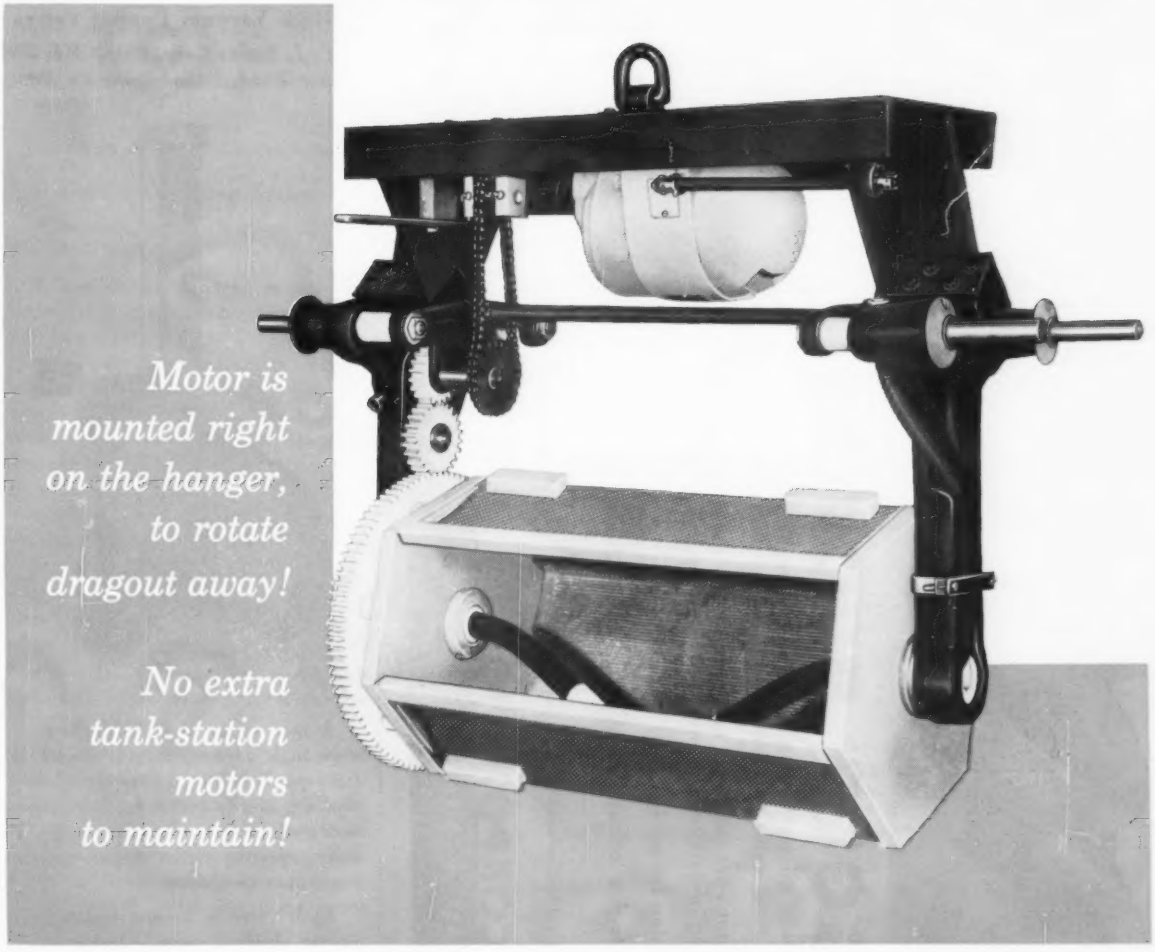
The above manufacturer is now offering its liquid brighteners in a new automatic-dispensing package, the Auto-Flo-Pak. The unit consists of a specially designed one-gallon, cube-shaped, disposable polyethylene container in a corrugated cardboard box. When used with the Auto-Flo Dispenser, consisting of a wire mounting rack and feed tube, it permits precise control over liquid brightener feed and increases brightener efficiency. For those who prefer to pour a specified amount of brightener into the plating solution, the unit has a handy pouring spout and measuring window.

To use the device, the operator simply tears out the perforated cardboard section on the package, pulls out the spout, and inserts the feed tube into the container. The rate of brightener flow is accurately controlled by adjusting the metal clamp attached to



the tube. Once the correct feed rate is obtained, it remains constant. When the package is emptied, the operator merely pulls out the tube, throws away the empty container, places a new package in the wire basket and inserts the tube into the new package. No readjustment is necessary.

59/Circle on Readers' Service Card



New H-VW-M mercil cylinder has its own motor drive

Step up your small-part production, cut maintenance costs and worries, with this efficient, economical unit!

Totally enclosed gear head motor drive (⅓ HP) has a hand-operated clutch for easy loading and unloading. A substantial channel-iron cover protects the drive unit parts from drippage.

The cylinder unit is designed for total submersion, and is fitted with double flexible dangler contacts. It may be operated with belt drive or regular gear drive as shown.

To meet your production requirements, this equipment is available with Melamine, Tempron, or Plexiglas cylinders, in 14" x 30" I.D., and 14" x 36" I.D. sizes. A long extension cord is furnished, to supply power from any convenient outlet box. Want more information? Write today to **Hanson-Van Winkle-Munning Company, Matawan, N. J. Offices in principal cities.**

H-VW-M

PLATEMANSHIP —Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

4549

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

61/Circle on Readers' Service Card

High Vacuum Poppet Valves

F. J. Stokes Corp., Dept. MF, 5500 Tabor Road, Philadelphia 20, Pa.

A new series of right angle poppet type high vacuum valves, Model 217, have quick-acting positive air cylinders, and are ideally suited for low-pressure applications in the micron range. The fully opening valve design provides maximum conductance.

Each valve is helium leak-tested to assure absolute vacuum tightness. The disc and body are plated to withstand severe service. The valve actuating stem is chromium plated for long life without shaft or seal scoring. The flange connections of all valve sizes are standard fittings.

Four-way manual control valves for the air cylinders are available as are four-way solenoid control valves for remote operation. The new valves are available from stock in 4″, 6″, 10″, and 16″ sizes; larger sizes up to 36″ can be built to order.

62/Circle on Readers' Service Card

Stopoff Lacquer

Titanine, Inc., Dept. MF, Morris & Elmwood Aves., Union, N. J.

Stopoff M-705 is a quick-dry, chemical resistant coating designed to withstand the action of high speed, high caustic copper plating baths. It is particularly effective against cathodic hydrogen bubbling developed when using high current densities for extended periods, or normal bright plating in the

copper-nickel-chrome cycle. After use, the stopoff may be quickly and effectively removed with simple solvents, it is stated.

63/Circle on Readers' Service Card

Barrel Finishing System

Minnesota Mining & Mfg. Co., Dept. MF, 900 Bush St., St. Paul 6, Minn.

A new barrel finishing system that slashes time cycles up to 70% and, for the first time, makes it possible to barrel finish inside diameters is based on a machine called the "Vibraslide." The system combines the principles of rotation and vibration to produce extremely rapid results during cut-down cycles; and is capable of utilizing either principle alone to achieve unique as well as standard results.

In addition to faster finishing time, another important feature is that up to three times the number of parts normally run in a standard barrel can be finished at the same time in the new unit, due to its slower rotation and vibrating action.

The machine resembles a standard octagonal barrel, except that the frame is necessarily larger (67½ x 50" x 8') to accommodate the vibratory system. The two motors and the vibrating mechanism can be slipped out from the back of the barrel frame for mainteance without dismantling the barrel. Other barrel components are standard.

The vibratory barrel will operate at rotating speeds from four to 20 rpm. The speed of the vibrator is fixed at 2,300 cycles per minute, and both ends of the barrel are synchronized with timing belts so that vibration is uniform throughout the media. The entire mechanism is rubber-mounted to hold frame vibration to a minimum, but securing of machinery is, of course, recommended.

The rapid rate of stock removal even with the barrel rotating at four rpm

The "Vibraslide" machine looks very much like a standard barrel, except that it is necessarily large to accommodate the vibrating mechanism.

64/Circle on Readers' Service Card

makes it possible to process delicate or large parts which previously had to be fixtured to prevent breaking or other damage.

Load levels presently being used with standard barrels are effective with the new system, it is claimed. It may be economical to reduce media and compound charges after the installation is made in a given plant, and several loads of parts have been run; however, no more materials are required than with standard barrels.

65/Circle on Readers' Service Card

Ultrasonic Cleaner

Lawrence Mfg. Corp., Dept. MF, Evans Terminal, North Broad St., Hillside, N. J.

Ultracleaner Model 500A incorporates the latest and most efficient design for ultrasonic cleaning of small parts and assemblies in manufacturing processes.

Of stainless steel and weighing 53 lbs., the unit can accommodate parts up to 10" in length. One dial tuning and compact design are featured. One or two ultrasonic chambers may be used concurrently.

66/Circle on Readers' Service Card

Loading Arm

Grav-i-Flo Corp., Dept. MF, 400 Norwood Ave., Sturgis, Mich.

An entirely new mechanical loading arm, which eliminates the need for an operator to lift fixtures manually, has been added to the "Spin-Finish" machine. The mechanical loading arm is pneumatically powered with finger tip hydraulic control. It provides quick, easy pick-up of fixtures for loading and unloading the machine. This cycle is controlled by one button which operates the loading arm vertically. For horizontal motion, the operator merely extends or retracts the telescoping arm.

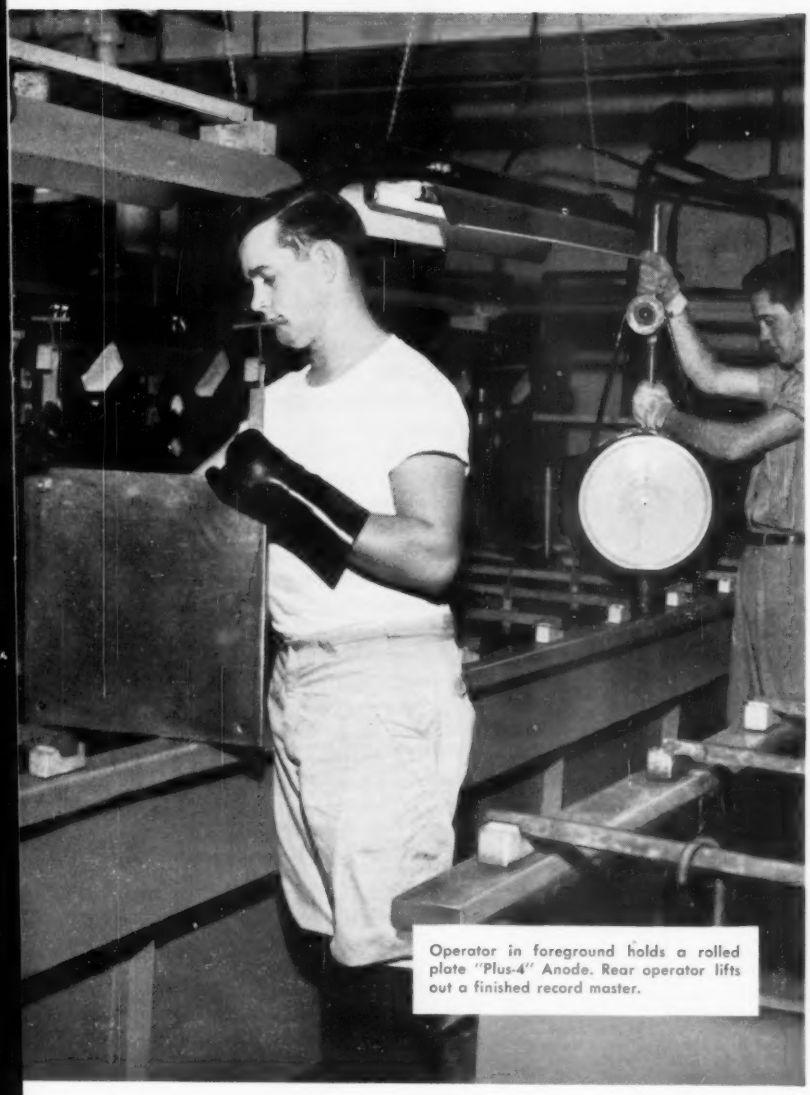
At the end of the mechanical loading arm is a fork which fits under the collar of the fixture. This fork and collar arrangement permits the operator to pick up fixtured parts and place them effortlessly into the machine. As part of the general ease and speed-up created by the mechanical loading arm, a rotary index table, controlled by the machine operator, is used for holding fixtures while parts are being racked and unracked.

67/Circle on Readers' Service Card

Aluminum Etchant

American Chemical Paint Co., Dept. MF, Ambler, Pa.

A new aluminum etchant is specifically designed to insure a consistent-



Operator in foreground holds a rolled plate "Plus-4" Anode. Rear operator lifts out a finished record master.

68/Circle on Readers' Service Card

ly uniform etch pattern and etch rate without scale build-up on tanks and coils. These advantages are independent of the aluminum concentration in the bath.

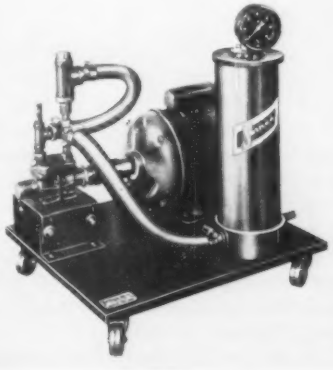
Another feature of this new aluminum etchant is that the type of etch and rate of etch will not vary when the etchant is used in industrial waters of various hardness.

69/Circle on Readers' Service Card

Self-Priming Filter Pumps

Sethco Mfg. Co., Dept. MF, 2234 Babylon Tpke., Merrick, N. Y.

A new stainless steel, self priming filter unit will remove particles down to 1 micron and has a capacity up to 4 gal./min. The SSTI series is constructed of 316 stainless steel with Teflon pump impeller and pump packing. Filter tubes can be of cotton, Dynel, porous stone or porous carbon. Powered by a ½ h.p., 115 v., 60 cycle, single phase motor, the unit is mounted on rubber tire ball-bearing casters for portability.



The pump is furnished with a bypass valve which automatically opens during filtration when the pressure inside the filter chamber reaches 35 psi. Optional equipment includes a reversing switch for backwashing the filter chamber without disassembly.

70/Circle on Readers' Service Card

External Mix Nozzle Spray Guns

Binks Mfg. Co., Dept. MF, 3122 Carroll Ave., Chicago 12, Ill.

Two new low priced lightweight spray guns, for general maintenance or occasional paint jobs, spray all types of paints and fast drying lacquers. They have been designated Models 35 and 36, and can be used with air compressors rated to 1 h.p.

Both models allow the use of an external mix nozzle set up so that fast drying materials may be sprayed without constant nozzle buildup, even while using as small as a ¼ h.p. compressor. On the Model 35, a simple, one knob adjustment accomplishes the change from siphon to pressure cup feed.

The Model 35 spray gun comes equipped with a one-quart siphon cup. The gun is the bleeder type without air valve. An internal mix nozzle is available for use in covering large areas quickly and efficiently.

The Model 36 is best adapted for use with a fluid pressure tank. It makes

use of the same external mix nozzle setup to spray fast drying materials without nozzle buildup. This model is the non-bleeder type and requires a constant speed unloader on the compressor.

72/Circle on Readers' Service Card

Abrasive Blasting Barrel

Pangborn Corp., Dept. MF, Hagerstown, Md.

Designed for metalworking factories which clean and descale heavy parts in large volume, the new 72 cu. ft. Rotoblast barrel was developed to provide a high-capacity, heavy-duty machine, with low maintenance and operating costs.

Believed to be the world's largest blast barrel manufactured, the new unit will clean a 6 ton load of castings in five minutes. The 72 Type GN barrel is equipped with two Rotoblast wheels, each capable of throwing 120,000 pounds of abrasive per hour. Each wheel is powered by a 40 h.p. motor. Heavy-duty motors are also utilized to power the shaker conveyor, the barrel door and the abrasive elevator. Horsepower of these motors is double to triple that used on conventional machines of this type. All operations of the new barrel including loading, starting, stopping and unloading art automatically operated from a convenient control panel.

A new, solid plate, abrasive-tight

door eliminates abrasive losses and permits economical use of newer premium quality abrasives. The wheel housings and blast chamber are completely lined with replaceable alloy plates for longer, continuous blasting periods. Drum ends are manganese steel. Another feature contributing to minimum maintenance is the heavy, reinforced steel barrel cabinet.

To cope with heavy sand loads during operation, a rugged, type BZ abrasive cleaning, recleaning system removes all sand and debris to maintain full abrasive efficiency. Scale, dust and broken-down abrasives are removed from the abrasive after which is returned to the wheel for reuse.

The barrel is 21 ft., 5 in. wide by 10 ft., 11 in. deep by 23 ft. high.

73/Circle on Readers' Service Card

Coloring and Burnishing Compound

Lord Chemical Corp., Dept. MF, 2068 So. Queen St., York, Pa.

Effective on all metals or alloys, Lorco Lustre-All is ideal for shops in which the number of barrel-finishing compounds must be kept to a minimum. This new all-purpose coloring or burnishing compound is claimed to impart a high gloss and a beautiful virgin-metal color to any metal or alloy in a run of 45 minutes to one hour. It leaves no film of any kind and yields clean work. The remarkable light color and high lustre produced equal or surpass those imparted by many special-purpose compounds, it is stated.

74/Circle on Readers' Service Card

Organic Finishes

United Wallpaper, Inc., Dept. MF, 1350 S. Kostner Ave., Chicago 23, Ill.

A series of chemical coatings combining a wide variety of protective properties has been produced under the trade name Koropon. Available in primers and enamels, it provides outstanding resistance to alkalies, acids,

solvents, salt water and salt spray, humidity and vapors, according to the company. At the same time the coatings are said to be unusually resilient. Possessing a high degree of adhesion to metal surfaces, the coatings tend to stop corrosion creepage and resist abrasion and impact stress.

The coatings are available in three basic types: cold curing catalyzed, air drying, and heat curing or baking. The catalyzed finishes resist the most extreme corrosive conditions. Baking types offer superior protection as tank linings. The air-drying finishes offer excellent outdoor durability and protection in moderately corrosive atmosphere.

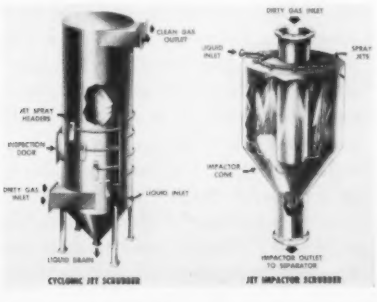
The coatings can be applied by brush, spray, dip and roller-coat as easily as conventional enamels. They are said to adhere well on concrete and other masonry type surfaces as well as on metal, and are available in a wide range of colors, including gloss, semi-gloss, and flat finishes; also in rust-inhibitive pigmented primers and sealers.

75/Circle on Readers' Service Card

Wet Type Gas Scrubbing Systems

Process Equip. Div., Automotive Rubber Co., Inc., Dept. MF, 12550 Beech Road, Detroit 39, Mich.

These new scrubbers are available in two types of designs: The Cyclonic "Jet" type to handle dust and liquid aerosols which are micron in size or larger. Particles developed from mechanical processes by disintegration. Next, the "Jet" Impactor type (agglomerator) to handle fumes, fogs and mists which are submicron in size. Particles developed from chemical or metallurgical operation where a change of physical state (usually by volatilization of combustion) occurs. Standard ARco scrubber sizes range from 500 to 20,000 CFM capacity. Both types of units are operated on water or other recycle solutions piped into spray jet headers located on the main body of the scrubber.



Where gas problems are unusual or require special design features, the manufacturer has available a complete portable pilot model scrubber for use right on the job. The operating data obtained by a company engineer at the source test will then be directly relative to the performance expected from the installed full scale scrubber.

77/Circle on Readers' Service Card

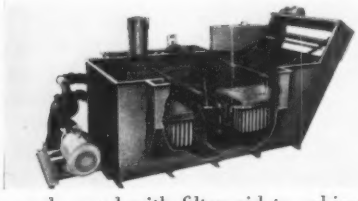
Dual Manifold Vacuum Filter

Industrial Filtration Co., Dept. MF, Lebanon, Ind.

The basic purpose of the new Delpark dual manifold filter is continuous filtration even when cleaning. To accomplish this, the manifolds are on a cycling operation in opposition to each other. When one manifold is filtering, the other is on backwash for cleaning of the permanent filtering elements.

Two forms of filtering elements and 2 optional types of filtering media are used. The elements are in leaf-type or tubular forms and the media is available in either nylon or wire screen. The leaf-type element permits immediate removal of the individual elements for inspection or maintenance. The form of the elements and the media used are contingent upon existing conditions of the specific fluid and the contaminants to be filtered.

Both forms of elements and media



may be used with filter aid to achieve absolute filtration.

Flow capacities range from 5 to 1000 G.P.M. Higher capacities are handled through use of multiple units.

79/Circle on Readers' Service Card

Cold Solvent

Octagon Process, Inc., Dept. MF, 31 Bank St., Staten Island 1, N. Y.

Klearall 110 safety solvent is inhibited and stabilized, with no effect on copper, brass, aluminum or other metals. It will not harm most insulating paints and varnishes, it is claimed. The solvent is not only non-inflammable and non-explosive, but it has an extremely low toxicity, and can be safely used under normal free ventilation in accordance with existing safety codes.

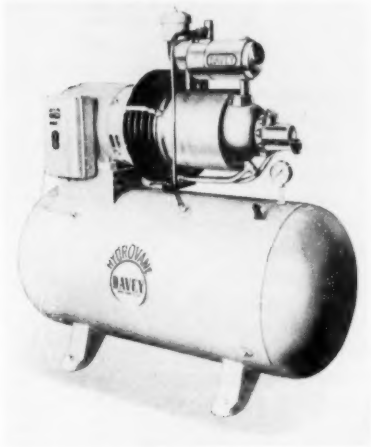
The material is used at full strength and at room temperature. It can be applied with a soft rag, brush or sponge, with a solid wet spray using conventional spray equipment, or the parts can be immersed and allowed to soak. It can be kept constantly clean through distillation, and can be reused over and over again.

It is available as a stock item in 55-gallon and 5-gallon drums and in 1-gallon case lots, (6 to a case).

80/Circle on Readers' Service Card

Air Compressors

Industrial Div., Davey Compressor Co., Dept. MF, Kent, Ohio.



A new line of tank-mounted rotary compressors in 2-3 and 5 h.p. models, known as Hydrovane Rotary units, operate at 100 and 200 p.s.i. Outstanding features include freedom from vibration and extreme quietness of operation. The manufacturer states that they are very easy to install and do not require special compressor rooms or foundations. Units are completely enclosed. There are no belts or couplings. Users have their choice of vertical or horizontal tank mountings.

Light weight plus compactness, which saves up to 60% of the space required by other compressors, is another reputed advantage.

81/Circle on Readers' Service Card

Temperature Control

The Partlow Corp., Dept. MF, 505 Campion Road, New Hartford (Utica), N. Y.

A new mercury-actuated indicating temperature control features a novel dual mounting design and greatly improved readability. Said to be accurate to within one-half percent of scale range, the controller will sense, indicate and control processes and appliances within the extreme ranges of —30 to 1100°F. It is available in ten different scale ranges.

Designed into the instrument, which is designated Model MFS, is an exclusive readability feature called "Accu-Vision" which is said to guarantee accuracy in setting and reading the in-

strument and to virtually eliminate the possibility of human error. This includes an increased dial area; a special magnifying setting pointer equipped with two hairlines for parallax sighting, plus an optically-designed combination of dial colors for the greatest possible contrast.

The instrument design also features an exclusive mounting arrangement which permits the case to be either flush or wall mounted without any additional mounting brackets or hardware. The contours of the case also permit the mounting to be done completely from the front of the panel.

The case is made of glass-reinforced polyester plastic in a neutral gray, semi-gloss finish. The case incorporates a flange which provides a camera type seal against both dust and moisture.

82/Circle on Readers' Service Card

Buffing Compound Remover

Stratford Chemical Co., Inc., Dept. MF, Honey St., Milford, Conn.

A new, high-speed buffing compound remover is claimed to remove fingerprints and oil as well as buffing compounds. The new remover, designated Compound 450, is said to combine speed of removal and completeness of removal with economy of operation. It does not stop on large "globs" of buffing compound, but continues to dissolve until the work is absolutely clean.

Safe to use on all metals, it will not etch or attack aluminum, zinc, brass, copper, or steel. It removes tarnish and brightens copper and copper alloys. It is said to produce no insoluble film. Solution may be allowed to dry on work (long transfer times) before rinsing without any "cloud" occurence under plate. In fact, work may be transferred directly to an alkali without rinsing with no subsequent "clouding."

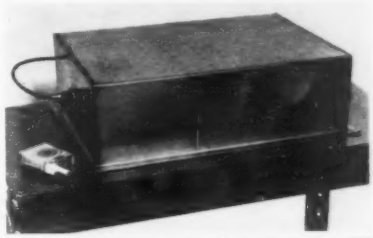
Supplied as a concentrated liquid, it is used at 3% and 180° F. in a plain steel tank. It is claimed by the manufacturer to have extremely long life together with extremely high tolerance for buffing compounds.

84/Circle on Readers' Service Card

Ultrasonic Equipment

General Ultrasonic Co., Dept. MF, 67 Mulberry St., Hartford, Conn.

A new line of ultrasonic processing equipment utilizes a novel, patented transducer element. The element is constructed mainly of solid metal sections and is joined to stainless steel radiating surfaces by welded studs, resulting in a product which is virtually indestructible. Because of the very high efficiency of this transducer, the equipment is powered by relatively small generators, producing high intensity ultrasonic energy at low initial cost and small operating expense.



Stainless Steel Immersion Sonicell, 14" x 20"

The transducers are built into self-contained stainless steel Sonitanks ranging in size from 6 quarts to 50 gallons. For larger installations, the transducers are built into all-welded, hermetically sealed, immersion Sonicells for use in existing tanks. These are made in sizes from 100 square inches to 300 square inches of radiating surface. The units are also made to custom requirements in almost any size and shape, and are available with pumps, filters, heaters, controls and rinse tanks.

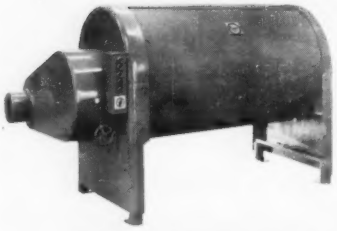
85/Circle on Readers' Service Card

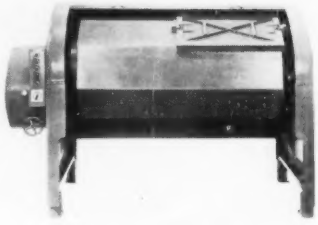
Barrel Finishing Machines

Crandall Engineering & Mfg., Inc., Dept. MF, Vicksburg, Mich.

Fifteen models of barrel finishing machines with capacities ranging from 5 to 25 cu. ft. are now being manufactured by the above company.

Designated the "No. 30 Series", the new machines feature streamlined design, exceptionally smooth operation, and a new and novel cylinder sealing method that insures leak-proof operation under all conditions.





The machines employ oversize variable-speed V-belt system which, combined with other engineering and manufacturing innovations, have reduced shock and vibration. The leak-proof design is accomplished by precision vulcanize molding the sealing surfaces on both the cylinder opening and the cylinder door.

Push button controls are conveniently located on the left side of the machine, with positive safety jogging to allow operator to inch cylinder forward or reverse during loading or unloading. Front closure extends well below cylinder and machine stops if closure is raised. Other safety factors include 110 volt control fused to eliminate short circuit hazard, safety pressure release, and fully enclosed motor and drive.

Variable speed is standard, with speed control handle mounted in front with speed indicator directly above. Speed reducer is oversize with sealed case and heat treated gears throughout. The reducer is shaft mounted for maximum drive life.

All models have full opening doors with no ledges to catch media and parts. Housing is ¼" steel, structural channel reinforcing with four legs to eliminate the need for special foundations. Cylinders are plate steel with gusseted and belled shafts.

The motor is Standard Nema rerated 1800 r.p.m. on fixed mount at rear of machine. One to five horsepower is used, according to machine size.

86/Circle on Readers' Service Card

Automatic Air Tracking of Abrasive Belts

Timesaver Sanders, Dept. MF, Box 7446, Robbinsdale Station, Minneapolis 22, Minn.

An automatic air tracking device will be standard equipment on all Model SPL and TOP machines in the manufacturer's 40″ and 50″ models. It is also available for all Model TOP-40 and TOP-50 machines now in use.

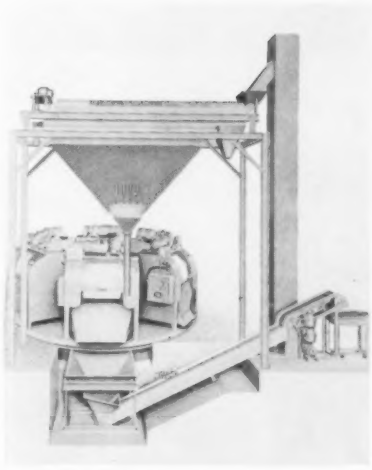
The air tracking device is mounted on the machine behind the sanding drum and belt distortion is practically nil. Automatic in operation, the device keeps the belt centered at all times. Movement of the belt in either direction off center activates the controls which automatically center the belt.

87/Circle on Readers' Service Card

Automatic-Turntable Barrel Finishing System

Almco, Queen Products, Inc., Dept. MF, Albert Lea, Minn.

A 6-station automatic barrel finishing system, mounted on a turntable and equipped with a "memory" device, automatically rotates completed work



to a single operator station for unloading and reloading. Each mounted barrel finishing machine is not only loaded with parts, media and compound at a single work station, but completed work is automatically returned to it for rinsing and mechanical separation, thus permitting an "in-line" production flow of parts from previous processes and out to other departments.

As the operator loads each barrel, he sets its timer for a prescribed processing cycle. In so doing, the time cycle also records on the turn-table "memory" device which automatically signals the timed-out barrel and rotates it to the operator's station when the work has been completed. Since each barrel is individually timed, the new system will simultaneously deburr and finish a variety of ferrous and nonferrous parts requiring a wide range of time cycles. Continuous processing from 15 minutes to 50 hours can thus be performed automatically. If large lots of parts requiring long time cycles are to be processed, two turntable systems can be mounted side by side with a common handling system between them. One operator handles all 12 barrels.

As each completed barrel load returns to the operator for draining and rinsing, the work parts and media are allowed to meter onto a conveyor belt for transfer to a magnetic separator as shown. The parts, being ferrous, are separated from the chips and pass up and over a demagnetizing coil and continue to "pick-off" tables or wire basket for removal to assembly department.

If both ferrous and non-ferrous parts are being processed, a high frequency vibrating screen can be added in the materials handling system for separating parts from media. In either case the media feeds directly into the boot of an internal discharge bucket elevator and is conveyed to the overhead rotary screen media classifier and multi-compartment storage bin. As many as 6 different medias can thus be used with pushbutton control for drawing chips from the storage hopper during re-charging of barrels.

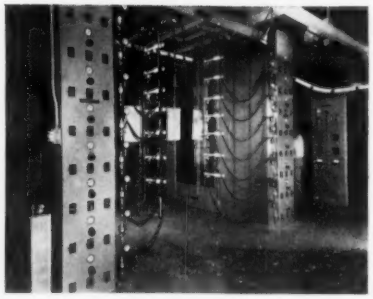
Many different types and sizes of barrel finishing machines can be mounted, permitting as many as 10 machines on one turntable. The manufacturer will also engineer systems to suit customers' special requirements.

90/Circle on Readers' Service Card

"Package" Electrostatic Spray System

H. G. Fischer & Co., Dept. MF, 9491 W. Belmont Ave., Franklin Park, Ill.

A variety of electrostatic paint spraying systems which are available as "package" units will successfully coat 85% of those parts suitable for electrostatic spraying, it is claimed. The systems, which are sold outright, include: spray booths, spray guns, electrodes, power rotators, pressure control panels, electrical control panels and high voltage transformers.



The power rotator, which is a moving flat belt powered by a variable-speed motor, engages a skate-wheel type rotating pendant causing the products, which are suspended from the latter, to rotate. Pressure control panels are said to provide precision control for all the spray guns so that maximum paint quality and operating economy can be attained.

All electrical controls are mounted on a single panel and conform to the National Board of Fire Underwriters Code. The high voltage transformer-rectifier operates on a 110 volt single phase line and has a total load of less than 1 kw. Its maximum output is 160 kv at 5 ma.

91/Circle on Readers' Service Card

Solution Surface Blanket

American Chemical Paint Co., Dept. MF, Ambler, Pa.

Serseal, a chemical blanket developed by the above manufacturer for use on their hot phosphate coating baths, acts as a barrier to prevent the escape of steam and fumes. Heat savings up to 70% have been reported in actual field use. The product has also shown great reductions in the cost and time required for maintenance of heating elements, it is claimed. Since the bath is sealed, there is little escape of fumes and vapors and, in most cases, costly ventilating systems can be safely eliminated. A patent application has been filed to cover this interesting invention.

92/Circle on Readers' Service Card

Copper Film Process

Bigelow Metallizing Chemicals Co., Dept. MF, P. O. Box 65, Quincy 69, Mass.

The Copperoid process is claimed to be an efficient and economical method of producing chemically reduced copper films on glass, ceramics, mica, plastics, rubber, etc., to serve as mirrors or as electrically conductive coat-

ings for printed circuitry and in electrotyping-electroforming techniques.

The material is sold as a unit containing four compounds, sensitizer, super-sensitizer, copper compound and reducer, which are dissolved in water, as per simple instructions, this saving shipping costs. Uniform films are formed on all surfaces, including the walls of drilled holes. It is stated that up to 300 sq. ft. or more can be coated with one gallon of prepared solution, which can be applied by immersion or flowing with very little equipment.

Trial units of the new product are available at a special price.

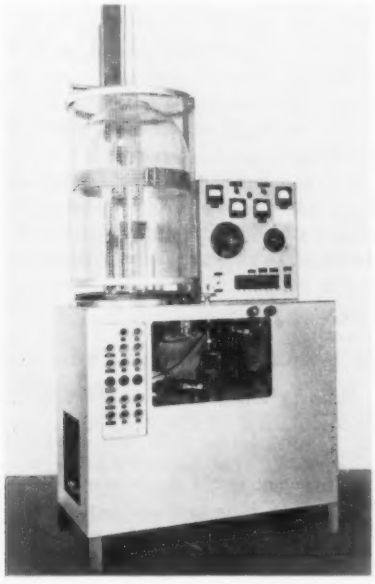
93/Circle on Readers' Service Card

Production-Size High Vacuum Evaporator

Kinney Mfg. Div., The New York Air Brake Co., Dept. MF, 3529 Washington St., Boston 30, Mass.

A new production-size high vacuum evaporator is designed for precisely-controlled deposition of evaporated coatings. Designated the P-5, this versatile new evaporator can be used for all types of vacuum coatings, such as: silver, gold, aluminum, magnesium, chromium, Inconel, stainless steel, magnesium fluoride, silicon monoxide, selenium and germanium; according to the manufacturer.

Ruggedly constructed, the unit has a stainless steel vacuum tank 36″ in diameter by 42″ in height and an electrically operated rotatable hoist for lifting the bell jar to afford convenient access to the work area. The high vacuum pumping system consits of a No. 1000 six-stage oil diffusion pump and a KDH 130 single-stage, gas-ballasted mechanical vacuum pump. It is claimed to reach a pressure of 1×10^{-4} mm Hg in seven minutes and attain ultimate pressure for 1×10^{-5} mm Hg. Many modifications are available as required for the particular applications involved.



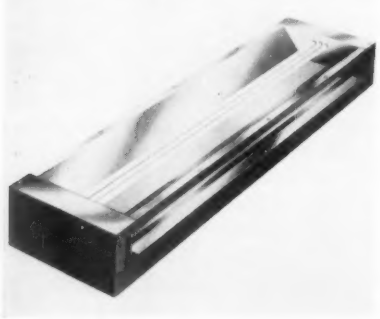
95/Circle on Readers' Service Card

Infrared Oven Sections

Fostoria Pressed Steel Corp., Dept. MF, Fostoria, Ohio.

A new series of infrared oven sections, accommodating all three proven linear heat sources and designated the 51-000, 52,000 Series, can be equipped with metal rods, quartz lamps or quartz tubes for industrial finishing operations. Two types of reflectors are available with the equipment, specular gold and aluminized steel. To gain maximum efficiency from any source used, the reflectors are optically designed to distribute an even pattern of radiant heat over the entire product. There are two basic sections in the new series. Both are identical in length, but are manufactured in two different widths. The 5½″ wide section is designed for use with one or two heat sources, while the 11″ model is prepared to use one, two or three sources. Both models are available in various lengths.

New socket design feature in the infrared sections makes it possible to load or change source units from the front of the oven. Terminal wires can be inserted into the sockets and securely fastened from the front. The new socket will accommodate one, two or three heat sources, thereby allowing the user to start operations with one source and increase the capabilities of his oven later on.



Other features of the new sections include: (1) New bolt-type construction that allows the rapid change in oven set-up to meet varying production requirements; (2) New electrical controls for exact selection of finishing temperatures; (3) New "open-end" design, which allows the addition of more sections when production requirements call for greater finishing capacity.

97/Circle on Readers' Service Card

Dimensional Separator

The Esbec Barrel Finishing Corp., Dept. MF, 18 Beech St., Byram, Conn.

The Dimensional Separator has been re-designed to give it greater accuracy, more flexibility and longer life. This machine will make difficult separations which cannot be made by either magnetic or shaker screen methods and which otherwise must be hand picked, it is claimed. Separations are made by reason of difference in critical dimensions. Thinner, flatter pieces drop through the adjustable gap between the rolls while thicker, chunkier pieces are carried off the end of the rolls.

The new design includes three separate discharge chutes underneath the rolls and one at the end. When the gap between the rolls is set in a V-shape, as many as four separations can be made at one time.

Greater accuracy and longer life result from the fact that the 4" diameter rolls are deep hardened and, with their shafts, are ground on centers.

Screw manufacturers use these machines to separate different sizes of screws which have been mixed deliberately to gain the economies of barrel plating.

The supplier states that the machine is accurate to within .0025". This great accuracy enables it to make many critical separations which cannot be made in any other way.

98/Circle on Readers' Service Card

Automatic Spray Gun

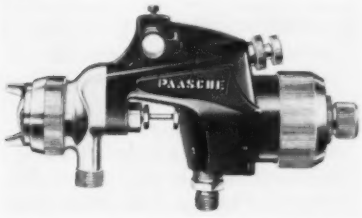
Paasche Airbrush Co., Dept. MF, 1909 W. Diversey Pkwy., Chicago 14, Ill.

A new automatic spray gun, Model 310, has an infinite spray pattern adjustment made possible by the dual air valve control, which permits the

use of air from the fan ports only, center air cap holes only, or an intermixture of any proportion of air from these sources. The atomizing air control and the fan control afford infinite pattern adjustment with a minimum number of air caps.

The gun is a two hose gun requiring one hose for fluid and one hose for air. Because of the dual control of air, it makes it possible to adjust both atomizing or fan air and to reduce atomizing air pressure below the pressure required to actuate the piston without the use of a third hose.

It is claimed that this is the only automatic gun on the market which uses a stainless steel fluid tip and stainless steel needle as standard equipment. The gun uses Teflon as a



packing material, which is self-lubricating, will not dry out, harden or deteriorate. A Teflon piston ring is used which does not require lubrication and has a much lower coefficient of friction or drag than other piston ring materials. The automatic gun construction utilizes the cartridge principle for easy replacement of parts.

99/Circle on Readers' Service Card

Drum Handler

Pucel Enterprises, Inc., Dept. MF, 3746 Kelley Ave., Cleveland 14, Ohio.

Grizzly Roto-Tilt lifts, tilts, rotates all kinds of open and closed drums, barrels; fiber containers, and boxes, for pouring, and holding for filling. Rated at 1,000 pound capacity, it does a big job at low cost. Used with fork truck, chain falls, chains and hoists, it is quickly, easily and safely operated by one man, and works equally well on old as well as new drums, containers, barrels and boxes, whether open or closed, battered or lopsided, all with the same ease and safe grip.

Light weight, weighing less than 50 pounds, the unit has lifting trolley equipped with ball bearings, enclosed in channel, with no exposed parts. Safety locking bracket secures upper jaws to top rim of drum, and serrated jaws and channel, and recessed drum bottom foot plate, insure positive locking hold. Of all welded construction, designed for heavy usage, finished in attractive safety orange, 3 models are available. No. 250 for 55 gallon drums; No. 251 for 30 gallon drums; and No. 252 for 15 gallon drums. Special units are engineered for particular requirements on request.

54/Circle on Readers' Service Card

Settling Tanks

Link-Belt Co., Dept. MF, Prudential Plaza, Chicago 1, Ill.

An improved settling tank design, the Uniflow, for removal of solids from water, sewage and industrial wastes, combines a rapid sloping bottom with multiple effluent weirs. This advanced design increases efficiency of solids removal, offers economical construction, and maintains the velocity of liquid throughout the tank at as nearly uniform a rate as practical tank construc-

tion allows. Straightline sludge collectors provide positive removal of scum from the surface of the liquid and sludge from the bottom of the tank.

102/Circle on Readers' Service Card

Plastic Fume Scrubber

Line-O-Coat Co., Dept. MF, 1230 So. Santa Fe Ave., Compton, Calif.

A new lightweight fume washer, said to be completely resistant to corrosion, is designed to remove acid-laden or harmful vapors and plating fumes from air exhausts. The new fume washer is designed of glass fiber-reinforced polyester to make it a life-time maintenance-free unit.

Because of its plastic composition it weighs only one third as much as conventional steel units, thus no extra foundation or special footings are required for installation. In addition, the unit's light weight allows roof installation (conserving valuable production floor space) and makes possible easy installation by plant maintenance personnel.

The fume washer's motor and blower are housed separately. The exhaust blower creates a powerful suction which draws fumes into the washer receiver shell. The fumes circulate through rotary action at controlled velocities while their solids and contaminates are washed into the water reservoir by a spray system.

It is unnecessary to disassemble the washer for service. The water reservoir requires only infrequent cleaning and is easily entered through a lower access door. Cleaning of the spray nozzles is achieved through upper access doors.

Conservation of water can be attained with a fully automatic recirculating system, available as accessory equipment. A pump and motor between the water supply and the washer circulate water continually from the reservoir back to the spray nozzles, with an automatic float valve maintaining constant water level.

103/Circle on Readers' Service Card

Coatings and Linings

Corrosion Control Co., Inc., Dept. MF, 516 Fifth Ave., New York 36, N. Y.

A new line of chemical resistant coatings and linings for plant maintenance and protection, called Corethylene 100 and Corethylene 101, is based on synthetic Hypalon rubber and is effective protection against a great many corrosive reagents including strong oxidizers such as concentrated nitric, chromic, etc. Its protection is effective over a wide temperature range. They offer the further advantage of curing at room temperature.

Corethylene 101 is a one-package, room temperature curing, spray, brush or roller coating. Brushed-on coats give a dry film thickness of at least 4-6 mils per coat.

Corethylene 100 is a two-package, room temperature curing, spray, brush sistant lining designed for immersion service over a wide temperature range. It may be brushed, sprayed or rolled by regular plant maintenance men and when cured at room temperature is superior to baked linings, it is claimed.

Brush and spray applications have been accomplished to give film thicknesses of five to 10 mils per coat. It is easily possible with one coat of primer and two topcoats to develop polyethylene rubber linings to tanks and equipment 20 mils thick.

The coatings are packaged in one-gallon cans, 5 gallon pails, and 55 gallon drums, and are available in the following standard colors: black, white, green, yellow, orange, red, blue, grey; special desired colors can be made up on orders of 50 gallons or more.

104/Circle on Readers' Service Card

Epoxy Cold Solvent Stripper

Octagon Process, Inc., Dept. MF, 30 Bank St., Staten Island 1, N. Y.

Octastrip 444 is the first actual low-cost, cold solvent stripper for epoxy finishes, as well as stripping of epons, vinyls, ureaformaldehyde resins, modified alkyds and other general industrial finishes, it is claimed. The stripper is safe to use on all metals and is ideal for tank immersion operations where fast production line stripping is required. It acts in 15 seconds to a minute. The puckered finish can be water-rinsed easily and freely, leaving a clean metal surface.

The product is non-inflammable, non-corrosive, and has an exceptionally long tank life. It can be safely used in mild steel tanks, at room temperature and in any adequately ventilated area.

A modified Octastrip 444-S is also available for economical stripping of surfaces of parts which cannot be immersed. This can be applied by brush and is ideal for partial stripping operations where only one section or area is to be stripped and refinished.

105/Circle on Readers' Service Card

BUSINESS ITEMS

New Quarters for Prophon Engineering

Prophon Engineering Co. announce the removal of their offices and laboratory to 1006 E. Elizabeth Ave., Linden, N. J., where they will continue the development and engineering of cost reduction and quality improvement techniques for the buffing and polishing industry. The new telephone number is Hunter 6-4796.

Udylite Announces Udysil Rectifier

A portion of the large crowd who attended the Udylite cocktail party and luncheon on January 25th to announce the "Udysil" silicon rectifier.

Ferro Elects New President

Harry T. Marks, executive vice president, was elected president of *Ferro Corporation* on January 21 at a meeting of the firm's board of directors. Mr. Marks, a 25-year veteran of the firm, will continue to carry out his present duties while assuming the position made vacant early that month by the sudden death of *C. D. Clawson*.

Born and educated in Canada, Mr. Marks first joined the concern's Canadian subsidiary in 1933 as plant superintendent, and subsequently has held the positions of export manager at the company's Cleveland headquarters, managing director of Ferro Brazil, manager of the international division, vice president — foreign operations, vice president—administration, and, in 1955, he was advanced to executive vice president.

Platzman Joins Lindale

Louis Platzman, formerly associated with *Stern & Brown, Inc.*, Long Island City, New York, is now with *Lindale Equipment & Supply Corp.*, a newly launched firm which will sell plating, polishing, spraying, tumbling, and casting equipment and supplies. Offices are located at 504 Smith St., Brooklyn 31, N. Y. Mr. Platzman has had 51 years experience in the metal finishing industry. Associated with him is *Harry Rothman*.

New Address For Rutherford Machinery

Rutherford Machinery Co., division of *Sun Chemical Corp.*, has moved its headquarters to 401 Central Ave., East Rutherford, N. J. Sales and service personnel as well as the manufacturing plant are located at the new address. The company's phone number in East Rutherford is WEbster 3-1200.

Stokes Opens New Office

The *Vacuum Equipment Division* of *F. J. Stokes Corp.*, Philadelphia, has opened a new sales office at 77 Bedford St., Stamford, Conn. Telephone number is Davis 3-2335.

John C. Coleman will be manager of the new office, which will serve the whole of New England, as well as the Bronx and all of Long Island. The office in Mount Vernon, N. Y., from which Mr. Coleman formerly served this territory, has been closed.

Gumm Appoints Martin and Marino

Frederick Gumm Chem. Co., Inc., Kearny, N. J., announces the recent appointment of *Howard F. Martin* as sales manager. Since 1949 he has covered Northern New Jersey as sales engineer for the company.

Mr. Martin received a B.S. in Chemical Engineering at Newark College of Engineering and a M.Ch.E. Degree at Polytechnic Institute of Brooklyn, New York. He was employed as metal finishing engineer by Western Electric Co. of Kearny, N. J., for five years; after which he held the position of general manager of a large production job plating shop for several years.

Louis J. Marino has been appointed sales representative for Northern New

Howard F. Martin

Louis J. Marino

Jersey. A veteran of World War II, Mr. Marino served with the U. S. Navy in the Pacific Theatre. He is a graduate of Pace College majoring in marketing, advertising and selling, and has had varied experience in selling cleaning compounds for the metal finishing industry.

Friedman Joins E. C. Electroplating Co.

E. C. Electroplating, Inc., Garfield, N. J., recently appointed *Isidore Friedman* to the newly created post of technical director. In expanding their precision plating services, the hard chrome specialists have announced that research and development, quality control, and analytical control will be conducted in the laboratory being erected by the company.

Mr. Friedman had been head of the plating and surface treatments unit of Wright Aeronautical Division. As such, he brings to his new position an extensive background in the plating of molybdenum and titanium, and in the study of the effects of electrodeposits on the physical properties of basis metals. He is a member of the N. Y. Branch of the A. E. S.

Pullman Vacuum Acquires Standard Abrasive

Pullman Vacuum Cleaner Corp. of Boston has announced the recent acquisition of the *Standard Abrasives Co.* of Holbrook, Mass., a manufacturer of quality coated abrasives, which will be operated as a separate division of the parent company.

Herman Sundhauss, who has been active in the manufacture of coated abrasives both in this country and abroad has been named division manager of the new affiliate.

Casalbi Company Appoints Globe Representative

Casalbi Company, Jackson, Mich., announces the appointment of *Clemtex, Inc.*, Houston, Tex., to handle the sale of their Globe barrel finishing equipment and supplies.

Clemtex, Inc. employ six sales engineers who will cover the state of Texas, selling direct to users of the firm's products. They will also cover sales through their dealer organizations in Oklahoma, Arkansas, West Tennessee, Lousiana and Mississippi.

District Manager Appointed By Wagner Bros.

George A. DeCario, for the past two years field service engineer, has been appointed district manager of the Northern Ohio area which includes Western Pennsylvania, for *Wagner Brothers Inc.*, Detroit. He will make Cleveland his headquarters.

Prior to joining the firm, DeCario was general foreman at General Motors' Ternstedt Division.

Wild Joins Heatbath Corp.

Heatbath Corp. announces the appointment of *Robert G. Wild* of 873 Roanoke Road, Cleveland Heights, Ohio, as representative for the north-

ern Ohio and Western Pennsylvania area.

Mr. Wild was formerly with the R. O. Hull Co. and R. W. Renton Co., both of Cleveland. He is a graduate of Western Reserve and is very active in the Cleveland Chapter of the A.E.S.

Gerald Ott, former representative in this area has resigned to return to private business.

Infilco Forms Australasia Company

Formation of *Infilco (Australasia) Pty. Ltd.* which will manufacture and market equipment for the treatment of water, sewage and industrial wastes in the Australasian area was announced recently. The new company replaces the partnership operated by *Gibson Battle & Co.* of Sidney, N.S.W. and *Infilco Inc.*

D. S. Witts has been appointed manager of the new organization and *Peter Squires*, who recently returned to Australia from the Infilco headquarters in Tucson, will be the Australasian technical representative.

Northwest Chemical Company Marks 25th Year

Growth from a one room plant to one of the country's leading manufacturers of industrial chemicals for metal finishing, with over 23,000 square feet of modern plant area, was celebrated in

December by *Northwest Chemical Co.*, of 9310 Roselawn, Detroit, Mich.

High point of the festivities was a dinner given for all employees by the management and the surprise presentation, by the employees, of a large oil painting for the firm's new lobby and engraved watches to the three founders, shown left to right, *H. J. McCracken*, president and general manager; *Helen M. Morell*, vice president; and *B. F. Lewis*, secretary-treasurer and chief technician of the firm's research laboratory.

Du Pont Appoints Spengeman

Willard F. Spengeman has been appointed director of the Technical Service Laboratory of Du Pont's Pigments Department. The laboratory, under construction at the company's applied research center at Chestnut Run near Wilmington, Del., was recently completed.

Ely Gonick, technical supervisor at the Edge Moor, Del., pigments plant, has been appointed assistant director of the new laboratory.

A native of Jersey City, Dr. Spengeman received a bachelor of science degree from the University of Wisconsin in 1930, earning a master of science degree in 1931, and his doctorate there in 1935.

Dr. Gonick, 32, was graduated from Drew University in June, 1948, after serving three years in the Navy. He received a doctor of philosophy degree in inorganic chemistry from Pennsylvania State University in 1951.

L. S. Hilton Manhattan Abrasive Sales Manager

The *Manhattan Rubber Division* of *Raybestos-Manhattan, Inc.*, Passaic, N. J., announces the appointment of *L. S. Hilton* as sales manager of abrasive and diamond wheel departments. He was previously assistant sales manager. He succeeds *W. H. Steinberg* who is now technical consultant.

Mr. Hilton started with the division in 1934 and has had wide abrasive wheel experience in the field, laboratory and manufacture. He is a graduate of George Washington University and took post graduate work at Stevens Institute of Technology.

Graver Appoints New District Manager

Graver Water Conditioning Co., a division of Union Tank Car Co., has announced the appointment of *Howard G. Egginson* as district manager in New England. Mr. Egginson, who will have his headquarters at 6 Beacon St., Boston, Mass., telephone CApitol 7-9414, will handle the firm's complete line of industrial and municipal water treatment and special applications equipment throughout New England.

Mr. Egginson holds a Professional Engineer license and a chemical engineering degree from Newark College of Engineering. Before joining the company, his background included over 17 years experience in the operational and technical phases of the water and liquid conditioning fields. He brings to the New England area extensive experience in practical and theoretical engineering.

Batchelor Honored on Retirement from Quaker Chemical

Frank Batchelor, executive vice president and one of the owner-founders of *Quaker Chemical Products Corp.*, Conshohocken, Pa., was honored recently on his retirement after 28 years' service with the company.

Approximately 500 employees and guests of the chemicals manufacturer attended a surprise testimonial dinner for Mr. Batchelor at the Benjamin Franklin Hotel in Philadelphia. *L. O. Benoliel*, president of the company, was toastmaster.

L. O. Benoliel (r), president, extends best wishes to Frank Batchelor on his retirement as executive vice president. Completing the jovial scene are Mrs. Batchelor (l) and Mrs. Benoliel.

Mr. Batchelor served as treasurer of the company since its inception in 1930 until his election as executive vice president in 1954. He will continue as a member of the company's board of directors.

Hot Spray Clinic Series Initiated By Spee-Flo

The Spee-Flo Co. has initiated a series of hot spray painting clinics to acquaint finishing personnel and painting contractors throughout the country with the latest methods in hot spray painting. The first clinic was held recently at Wilkes-Barre, Pennsylvania. Sponsored by the local chapter of the Painters, Decorators and Contractors Association, the clinic featured informal discussion on finishing problems and a demonstration.

At the clinics a system of spraying without atomizing air and standard hot spray equipment will be demonstrated. Individual finishing problems will be discussed and the theory of hot spray method explained.

Further information on the clinics may be obtained by writing the company, 720 Polk, Houston, Tex.

Peninsular Completes Acquisition Of Nankervis Co.

Peninsular Metal Products Corp. has announced the conclusion of arrangements to acquire the *George L. Nan-*

Henry W. Grikscheit

Vernon G. Converse, III

kervis Co. and also named new directors and officers of the company.

Frederick E. Burnham, well-known financial advisor, was named executive vice president of Nankervis and also a member of the board of directors. *Harold M. Cherry*, executive of the company since 1944, came out of retirement a year ago, upon the death of *George Nankervis*, to take over management responsibilities. He has now agreed to stay on as vice president in charge of the metal finishing division, a field in which he is well-known throughout industry.

Henry W. Grikscheit, recognized authority on aircraft and automotive engine test facilities and who expanded the activities of the company into this growing field, will continue as sales vice president and a member of the board.

Other company officers elected to the board of directors were: *Stanley R. Andersen*, secretary-treasurer; and *Frank E. Kenney*, vice president. *J. Oliver Black* and *S. W. Sorensen, Jr.*, named president, will also serve on the board. *Vernon G. Converse III*, with the firm since 1950 in various manufacturing and management positions, was promoted to vice president in charge of manufacturing.

Young & Co. Appoints Whitt

Bill Young & Co., Inc., dealers in finishing supplies and equipment, have announced the appointment of *Charles*

Charles C. Whitt

William R. Wardrop

C. Whitt, as salesman to serve the Kentucky-Tennessee area.

Mr. Whitt was born and educated in Montgomery County, Kentucky. He served with the United States Navy in the Pacific for two years before studying industrial chemistry at Murray State College and the University of Kentucky. He was associated with International Harvester Co. for six years, and was chemist and foreman in charge of assembly and finishing for the past two years for Universal Button Co., Lawrenceburg, Ky.

Wardrop Joins Better Finishes

William R. Wardrop has been appointed sales engineering representative for *Better Finishes & Coatings, Inc.* in the upper New York State area with headquarters at 150 Avalon Drive, Snyder, N. Y.

For the past 8 years Mr. Wardrop has specialized in the use and application of corrosion resistant resin coatings and linings and sprayed metal and ceramic coatings. He is a member and past chairman of the Niagara Section of the National Association of Corrosion Engineers.

Kiser Joins Frederic B. Stevens, Inc.

The appointment of *Clayton Kiser* as sales engineer has been announced by *Frederic B. Stevens, Inc.*

Mr. Kiser comes to the company

Clayton Kiser

from the Frigidaire Division of General Motors where he has been employed as an electrochemist for several years.

A graduate of the University of Kentucky, Mr. Kiser will represent the concern, a leading supplier of metal finishing and foundry equipment and supplies, in southern Ohio, Kentucky and Tennessee. He will make his headquarters at the Dayton Branch on 516 Broad Blvd.

Lea-Michigan Purchases Industrial Lubricants

As of January 2, 1958, *Lea-Michigan, Inc.*, subsidiary of *The Lea Mfg. Co.*, purchased all of the inventory, good will and trademarks of the *Industrial Lubricants Co., Inc.*, and plans to continue the manufacture and sales of Grainlock cements and Drawco drawing compounds under the style of:

Industrial Lubricants Div.
Lea-Michigan, Inc.
14459 Wildemere
Detroit 6, Mich.
Telephone TOwnsend 8-1490

As soon as is practical, Lea-Michigan will move its entire office from its present quarters on Stansbury Ave., Detroit to the above address, but will continue to operate both manufacturing plants until further notice. No changes are contemplated in the presently existing sales and distribution arrangements.

40-Year Diamond Veteran Honored

A. M. Waller (left) for the past 10 years manager of *Diamond Alkali Co.'s* chromium chemicals plant at Kearny, N. J., has just completed four decades of service with this leading producer of chemicals. A specially engraved gold watch was given to him by the company to commemorate the occasion. He is shown here receiving the memento and congratulations from *A. H. Ingley* (right), executive vice president.

Changes at Seymour Mfg.

The Seymour Mfg. Co., Seymour, Conn., has named *Huntley M. Campbell*, formerly of Western Brass Products Metals Division, Olin Mathieson Chemical Corp., to direct sales at its New York office, 122 East 42nd St. *Spencer Ross*, previously with Volco Brass & Copper Co., simultaneously was appointed assistant to Mr. Campbell. Each man has over 20 years sales executive experience in the non-ferrous metals industry.

Harold S. Samson, previous New York branch manager for 35 years and a member of the organization for 48, will stay on as consultant following his return from vacation.

Asarco Forms New Mexican Subsidiary

American Smelting and Refining Co. has just formed a new Mexican subsidiary, *Enthone de Mexico S.A.*, with headquarters in Mexico City. The new firm will manufacture and market a broad line of special chemicals to serve the particular needs of the Mexican metal-finishing industries. Initial plans call for production of such materials as cleaners, paint and enamel strippers, metal strippers, blackeners, rust inhibitors and rust preventatives, as well as burnishing, pickling, tumbling, descaling and derusting compounds. The new Mexican firm will also supply metal-

Camilo Torres McDonald

finishing equipment such as agitators, anodes, tanks and other accessories used by platers and metal processors.

The new firm will be managed by *Camilo Torres McDonald*, who is a Mexican national. He is a graduate of the School of Engineering at Texas A. & M. and has acted as Enthone's Mexican distributor for three years. Mr. Torres has extensive experience in the metal-finishing business, both in Mexico and the United States. He is founder and president of the Mexican Electroplaters Society, S.M.G.

Offices of the new subsidiary will be located at Avenida Juarez 127, Desp. 11, Mexico 1, D.F., Mexico.

Shell Chemical Names Three To Sales Positions

Three management changes have been announced in the *Chemical Sales Division* of *Shell Chemical Corp. Thomas F. Mika*, assistant to sales development manager, was named as-

Thomas F. Mika

William A. McCormick

John R. Brady, Jr.

sistant to sales manager, New York. *William A. McCormick*, district manager, St. Louis, was named assistant to sales development manager, New York. *John R. Brady, Jr.*, senior technical salesman of the company's Torrance, Calif., synthetic rubber sales division, has been named district manager, St. Louis.

Wyandotte Chemicals Announces Promotions

A series of promotions was recently announced by *Wyandotte Chemicals Corp., J. B. Ford Division. Howard Hastedt*, who has been Chicago district sales manager since February 1st, 1952, has been promoted to the home office staff as manager dishwashing and maintenance sales. *C. J. Martin*, who has been Buffalo district sales manager since December 27, 1954, has been promoted to manage the Chicago district. *W. Wright Lee*, formerly an Atlanta district field sales manager, has been

Howard Hastedt

C. J. Martin

W. Wright Lee

promoted to manage the Buffalo district.

OBITUARIES

JOHN P. RYAN

The many friends of *John P. Ryan*, who was affiliated with *L. J. Land, Inc.*, will be saddened to learn of his death on January 27, 1958.

C. DUDLEY CLAWSON

C. Dudley Clawson, president of *Ferro Corporation*, died Saturday, January 4, from a heart attack while on a trip in Mexico City. He had returned from Yucatan and was visiting a subsidiary, Ferro Enamel De Mexico, S. A. He was 55.

A 27-year veteran of the company, Mr. Clawson had been president of the Cleveland concern, the world's largest producer of porcelain enamel, since 1947. Prior to that he held the post of vice president of sales, and earlier had served two years as managing director of Ferro Enamel (Brazil), S. A., another subsidiary.

Mr. Clawson was born April 6, 1902, in Hamilton, Ohio, and received a degree in Ceramic Engineering from Ohio State University in 1925. In 1956, he received a distinguished alumnus award from the engineering school at the university. He attended the Harvard Advanced Management course in 1953.

A. M. TAYLOR

Arnold M. Taylor, a long time associate of *Murphy Varnish Co.* and *Interchemical Corp.* passed away suddenly on December 16 in Orange Memorial Hospital, Orange, New Jersey. He was 65.

He attended Cornell University and the University of Buffalo where he graduated in 1915. He spent a number of years with DuPont and Atlas Powder Co., Zapon Division in Stamford, Conn., before coming to Murphy in 1925, where he soon rose to the position of technical director.

He leaves his wife *Amanda B.* and one daughter *Mrs. Leslie S. Wilcoxson, Jr.* He was a resident of Maplewood, N. J.

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

Waterbury Branch

The Waterbury Branch held their monthly meeting in the Colonial Room of the Roger Smith Hotel, Thursday, January 9th.

Isidore Cross, librarian, arranged a panel discussion for this meeting. Panel members were as follows: *Ed Washburn*, Enthone, Inc.; *Isidore Cross*, Harper Leader; *Jack Hyner*, Whyco Chromium; *William Giesker*, Scovill Mfg. Co. Their subject was "Plating and Finishing Problems."

The February meeting has been designated the "Sustaining Members'

Night" and a special program will highlight the research program. At this time the branch will entertain representatives from the present sustaining members as well as representatives from companies who should be more interested in and better acquainted with the A.E.S. research program. *Andrew Perrin*, retired for about 10 years from Waterbury Mfg. Co., a division of Chase Brass & Copper Co., died December 23, 1957. He has been a member of Waterbury Branch for over 27 years and contributed much to the early success of the Branch.

Benjamin H. McGar, in anticipation of his retirement from Chase Brass & Copper Co. in the early part of 1958, has submitted a letter of resignation from Waterbury Branch. He has been a member for over 30 years. Although, in recent years, his work has not been closely connected with plating and finishing, for many years he contributed generously to the early success and growth of the Branch. His resignation will take effect March 31, 1958.

Nicholas Topazio
Publicity Director

Newark Branch

Following the film presentation, "Water, Wealth or Worry", by *Howard Cobb*, President Grigat called the business meeting to order. *Don Foulke* reported Grand Rapids' presentation of *Chet Borlet* as a candidate for national 3rd Vice-President and announced the Philadelphia, January, and New York, February, (annual) meetings.

Visitors introduced were: *Tom Trumbour* (N. Y.), *Joe Petrocelli* (Waterbury), *Mike Weston* and *James Mitchell* of American Metal Climax and *William Perrella* of Alumaco. Four applications were turned over to the board of managers and *George Apgar* of H-VW-M, *Joseph Conrad* of U. S. Metal Coatings Co., *Quincy Lucarello* of Alumaco and *Joseph Wisner* of American Sound Corp. were elected to membership.

Gus Bittrich reported the Newark Branch Electroplating School all set to start on February 11th. *Dr. A. Wesley* reported that the Interim Meeting of the A.E.S. held on January 11th at Indianapolis, at which Newark was represented by all three delegates, was worthwhile. He outlined the various actions taken, including the 15-month billing to occur in March.

Librarian *Fred Meyer* introduced *Gerald Van Tillberg*, product development engineer of American Metal Climax whose "Timely Topic" was copper anodes, with particular reference to the advantages of OFHC copper anodes. *Louis Donroe* then took over and conducted his question and answer program. Questions ranged from platers' putty and polishing compound removal from blind holes to phosphate treatments and leaded copper plating.

The meeting was voted a real success by the seventy attending.

D. Gardner Foulke
Secretary

British Columbia Branch

The general meeting on Jan. 15, 1958, was held at the White Spot Dining Room. Treasurer *R. Price* gave a report indicating a bank balance of over $200. Letters from *Frank Virgil*, Los Angeles Branch, Metal & Thermit and International Nickel regarding fu-

ture speakers were read by the secretary.

There was a short discussion regarding meeting attendance, which concluded with the suggestion that card notices by mail be followed up by phone calls made by a rotating committee. There was also a short discussion regarding the proposed Seattle joint meeting which is now tentatively scheduled for March.

Pres. *Bill Marquardt* introduced the speaker of the evening, *A. Weisberg* of Technic, Inc., Mr. Weisberg's talk covered various aspects of the precious metal plating industry, both jewelry and electronics application. As this was a completely new field for most of the members much interest was shown and, following his talk Mr. Weisberg, answered many technical questions.

Jim Lee
Secretary

New York Branch

The New York Branch held its annual Educational Session and Banquet at the Hotel Statler Saturday, February 1.

Joseph Rembecki

Joe Rembecki, chairman, and his committee did a splendid job, as the attendance at the various functions of the day will attest. The Ladies Party, held during the afternoon, drew approximately 50. The educational session, which had three top-notch speakers, *Dr. Walter R. Meyer*, *Myron B. Diggin* and *Dr. Abner Brenner*, had an attendance of 140. The banquet, which featured good food, a fine floor show and dancing, drew 100.

Indianapolis Branch

The Indianapolis AES held their January meeting at the Marott Hotel on Friday the 10th to cooperate with the National AES 5th Interim meeting held the following day. Eighty members and guests attended the dinner and meeting. *Bert Hawhee* introduced *Francis Eddy*, *Herberth Head*, *Ralph Wysong*, *Dr. W. A. Wesley*, *Dr. Samuel Heiman*, and *John P. Nichols*. Introductions of branch members and visiting guests followed.

The following new applicants were accepted: *William E. Hilsman*, *Ernest Perkins*, *Frank J. Rada, Jr.*, *Bill Felix Rothschild*, *Ralph Clayton Watson* and *Allan L. Wudi*.

Les Reynolds made a motion that the branch recognize with a moment of silence the passing of fellow member *Lowell S. Fisher*. This motion was seconded and carried.

Richard Watson, president of Grand

Rapids Branch invited other members to attend their meeting on February 15. Feb. 14-15 is also a regional meeting at Atlanta, Georgia. *Addison Howard* presented the "Koordinators," a barber shop quartet who sang five numbers which everyone enjoyed.

For the educational program, Mr. Howard introduced *R. C. Gibson* of Parker Rust Proof Co., whose subject was phosphate coating of metals. Using slides, Mr. Gibson gave a very good picture of how to use phosphate coatings. Questions and answers followed, and the meeting adjourned 9:45 P.M.

Paul Freeman
Secretary

Toronto Branch

The January 10th meeting of the Toronto Branch was held at the "Royal York Hotel.

Secretary *Ernie Hutt* reported that *Kergan Wells* of W. W. Wells, Toronto, brought back a report from Washington and a vote of thanks to both the Toronto and Western Ontario Branches for their extra $100.00 contribution to the Research Fund. He will represent the Toronto Branch at the Interim Meeting in Indianapolis on January 11th, being appointed official delegate. *Bill Findlay*, from the Hamilton Branch, and 40 members of the Toronto Branch were present at the meeting to learn about "Paint Finishing."

Pat Patterson introduced the speaker *Harry E. Emmett*, technical service director, Glidden Co. Ltd., Toronto. Harry has 22 years in the field of "Automated Finishing" and it was quite interesting to learn the various ways of applying paint finishes, and the saving that can be realized by using the right procedures. The meeting adjourned at 9.10 and a social evening followed with cards and refreshments.

A. W. Wilson
Librarian

Boston Branch

The Boston Branch will hold its 22nd Annual Technical Session and Banquet on Saturday, May 3, 1958. There will be a special Ladies Program at 1:00 p.m., and the Technical Session will be held at 2:00 p.m. at the Bay State Room of the Hotel Statler.

The speakers will be *Dr. D. Gardner Foulke*, Hanson-Van Winkle-Munning Co., Matawan, N. J., whose topic will be, "New Advancements in Waste Disposal Treatment"; *R. E. Pettit*, Diversey Corp., Chicago, Ill., who will speak on, "Etching of Aluminum on Name-plates and Chemical Milling"; and *Joseph P. Stella*, Promat Div., Poor & Co., Waukegan, Ill., who will discuss, "Conversion Coatings and Dyeing of Conversion Coatings."

The banquet, floor show and dancing will take place in the Grand Ball Room, beginning at 7:00 p.m.

George P. Swift
Secretary

Lancaster Branch

The January meeting was held in the Lincoln Woods Inn, East York, Pa. with forty-seven members and guests present. It was one of the best attended educational meetings in some time.

During the business meeting. *William Fordney* was elected to the board of managers to replace *R. Vines* who has moved away from the Branch.

One application for membership was presented for approval giving the Branch eight new members and one potential member since the Fall of 1957.

After a meal at the Lincoln Woods Inn, Librarian, *P. Sharretts* introduced *Tom Morgan* of the Reynolds Co., Philadelphia, Pa., who gave an interesting talk on bright copper. A discussion period on proprietary bright coppers in use at the present time concluded the program.

Robert S. Plaisted
Secretary

Southeastern Branch

The Southeastern Branch met at the Belmont Steak House, January 10. Final plans were announced for the 3rd Annual Technical Session. *Hugh Gehman*, assistant manager of development, American Chemical Paint Co. spoke on "A Discussion of Chemical Conversion Coatings on Metals." Four new members were announced: *George W. Asher*, F. H. Ross & Co., Atlanta; *Earl J. Kelly*, Metal Products Division, Adel, Ga.; *Jerry LaChapelle*, F. C. & J. C. Codman Co., Atlanta; *Pat N. Milikin*, Production Plating, Adel, Ga.

Robert H. Probert
Secretary & Treasurer

Los Angeles Branch

The lure of a talk on precious metal plating, which is becoming an increasingly important activity in Southern California aircraft, missile and electronics industries, drew an S.R.O. attendance of 135 members and guests to the January 8 meeting of Los Angeles Branch, in Rodger Young Auditorium.

Virtually all the larger aircraft plants in the Los Angeles metropolitan area, and many of the electronics and printed circuitry operators, were represented at the meeting. The speaker was *Alfred M. Weisberg* of Chicago, vice-president of Technic, Inc., of Providence, R. I., who devoted the forepart of his talk to a discussion of how the physical properties of certain precious metals can be modified by inclusion of alloys.

He explained why, as a rule, all precious metals are grouped together, although they vary chemically, the bath used in one case being acid, for another metal, alkali, and still other variances being present. Mr. Weisberg then discussed precious metal alloys and how the process of alloying such metals came about as the result of various industries demanding precious metals that have a longer life than in their original state.

Six new members were initiated at the January 8 meeting by President *George Magurean*. These were: *Allan L. Berger, A. Anzebian, John Kenkton, R. C. Platt, Don C. Johnson* and *Tom Brewer*.

Sergeant-at-arms *Milton Weiner* introduced the following guests: *W. G. Powers* and *G. Edson* of Hughes Aircraft; *Harry Ruben* of Brite Plating Co.; *Paul Schlocker*, F. C. Woefel Co.; *Jerry Burton*, Burton Silver Plating Co.; *Gilbert Stock*, Electroforming, Inc.; *Pat Mulligan*, DEC Plating Co.; *Charles M. Dowleer*, Auto-Technic Co.; *Gil Bishop*, Coronado Mfg. Co.; *Carl Virginius*, Ramo-Woolridge Co.; *Mason Clark* and *D. L. Rumph*, Van Nuys Plating Co.; *R. D. Martin*, Han-

son-Van Winkle-Munning Co.; and *Don Johnson*, Travis Plating Co.

Chicago Branch

The Chicago Branch held its regular January meeting at the Western Society of Engineers, Friday, January 3, 1958. The speakers for the evening were *L. M. Glassner*, secretary of the Chicago Platers Institute; *Lawrence J. Hay*, Plating Service Co.; *Chester J. Kennedy*, American Buffing and Processing Co.; *Phil J. Ritzenthaler*, Plating Engineering Co.; and *C. Edw. Smith*, B. Mercil & Sons Plating Co. The subject for the evening was a panel discussion of "The Role of the Job Shop Plating Industry in our Industrial Area."

Mr. Glassner commented on the various functions the Institute performs for the plating industry. Mr. Kennedy discussed the various types of polishing and buffing machines which are found in our area to do a specific job on various metal parts. Mr. Ritzenthaler discussed the various special finishing processes a job shop may be called to perform, such as the electropolishing of intricate parts; electroforming of materials for special applications; the build-up of materials with hard chrome and nickel; nickel cladding; and protection of equipment from corrosion by heavy plating with nickel.

Mr. Smith, the last speaker of the evening, spoke on the role of the job shop in the plating of small parts in large volumes, short run production items, plating of materials when time is an essence, and the cooperation of the job shop with industrial concerns on plating problems. An informative question and answer period followed.

Springfield Branch

The 19th annual New England regional meeting and banquet will be held on Saturday, April 12, 1958 at the Hotel Statler, in Hartford, Conn.

Detroit Branch

The fifth meeting of the 1957-58 series was held on Friday, January 3rd, 1958, in the Michigan Room of the Statler Hotel. This was a joint meeting with The Electrochemical Society and was opened by A.E.S. Branch President, *Glen H. Friedt, Jr.*

Secretary *Ed Kubis* introduced six applicants for membership and they were elected. Educational Chairman *Dough Thomas* introduced the technical chairman of The Electrochemical Society, *Dr. Ed Remick* of Wayne State University. Dr. Remick invited all members interested in attending a joint meeting of The Electrochemical Society and the National Association of Corrosion Engineers to hear *Dr. Charles Faust* of Battelle Institute give a lecture on the "Fundamentals of Corrosion Protection by Metallic Coatings."

Dr. Henry Leidheiser, Jr., of the Virginia Institute of Scientific Research of Richmond Virginia, the evening's guest speaker, was introduced by Dr. Remick. The subject for the evening, "Fundamental Studies of Microthrowing Power and Leveling," was very ably presented and illustrated with numerous slides to demonstrate leveling action and plating in cracks and pores of varying sizes and depths.

The meeting adjourned at 10 p.m. at which time refreshments were served.

Robert J. Amis
Publicity Chairman

M.E.P.A.

The *Masters' Electro-Plating Association* of New York announces that it will hold its 40th Annual Banquet at the *Astor Hotel*, New York City, on Saturday, June 14, 1958. The cocktail hour will start at 6:30 P.M., followed by the banquet, dance, and entertainment. Subscription to the banquet is $25.00 per person — dress optional.

This is one of the outstanding events of the year in the industry, and suppliers, job-platers, and their friends all look forward eagerly to attending. The Association, which has strived in every way to raise the technical, business and ethical standards of the industry, was formed in 1918 with a few hardy pioneers. It has now grown to almost 100 members in the Metropolitan area.

This year *A. Galfunt*, Hudson Chromium Co., is the banquet chairman. *M. Ranno*, Imperial Plating Co., is chairman of the Association; *L. A. Kornblum*, Kings Electro Plating Co., is vice chairman; and *Frank Kaiser*, Long Island Mechanical Plating Co., is treasurer. *A. T. Marinaro* is the Executive Secretary, with offices at 59 E. Fourth St., New York 3, N. Y.

THE ELECTROCHEMICAL SOCIETY

The Electrochemical Society will hold a five day meeting at the Hotel Statler, New York City, during the week of April 27. The five divisions scheduling technical sessions are—

Electric Insulation Division
Electronics Division
Electrothermics and Metallurgy Division
Industrial Electrolytic Division
Theoretical Electrochemical Division

Highlights of the meeting will be symposia on stress corrosion cracking of stainless steels, high purity metals, semi-conductor materials, fused salt electrolysis, ceramics, plastic insulation, printed circuits, and electrokinetic phenomena.

Dr. Abner Brenner, National Bureau of Standards, will deliver the Richards Memorial Lecture on the subject "Electrolysis in Nonaqueous Solutions."

NATIONAL ASSN. OF CORROSION ENGINEERS

L. L. Whiteneck, vice-president and director of materials research for Plicoflex, Inc., Los Angeles, Calif., has been elected president of the National Association of Corrosion Engineers. He will take office, with others, on the last day of the March 17-21, Annual Conference and Exhibition in San Francisco.

Also elected were *Hugh P. Godard*, head of the Chemical Division, Aluminium Laboratories, Ltd., Kingston, Ontario, vice-president and *A. L. Stegner*, corrosion engineer for Tennessee Gas Transmission Co., Houston, re-elected for a second term as treasurer.

The 1957 Willis Rodney Whitney Award will be given to *T. P. Hoar*, lecturer in metallurgy, Cambridge University, England. The Frank Newman Speller Award will go to *Robert J. Kuhn*, for more than 30 years corrosion engineer for New Orleans Public

Service, Incorporated, New Orleans, Louisiana.

The awards will be presented during the annual banquet of the Association, Wednesday, March 19.

News from California

By Fred A. Herr

H. G. Robins, chief chemist for Lawrence Smith & Co., hardware manufacturers and finishers in Sydney, Australia, spent several days in Southern California recently visiting various plating plants. Mr. Robins had been on a trip to England during the latter weeks of 1957 and, thereafter, spent several weeks on plating plant inspections in New England, New Jersey, Detroit and Chicago.

Upon his arrival in Los Angeles, Mr. Robins was escorted by *Herman J. Struckhoff* of Lacon Engineering & Sales Co., on a tour of plants in Los Angeles and vicinity. Prominent among these was the plant of the Kwik-Set Lock Co. in Anaheim where the use of powdered metal probably finds its greatest use on the West Coast. *Don Bedwell* who, with Mrs. Bedwell, had visited Sydney in July, 1957, took over the following day and arranged for several other plant visits, including the large plating facility of Cadmium & Nickel Plating Co., and the operations at the Hall-Mack Co. over which Bedwell presided as plant foreman until his recent retirement.

Alfred M. Weisberg of Chicago, vice-president of Technic, Inc., certainly had himself a busy week in mid-January. If he had figured up his traveling time he would possibly have found that for the period January 7 to 16 he spent more time in the air than on the ground. On January 7 he flew from Chicago to Los Angeles to address the A.E.S. branch on precious metal plating. The night of January 8 he flew back to the Middle-West to keep a date for a similar talk before the Milwaukee branch on January 13. Then back on the plane to fly to Portland, Ore., for a talk to Portland branch on January 14, Seattle branch on January 15 and Vancouver, B. C., on January 16. Then back to Chicago for a rest. The figures add up to about 9,900 miles of flying in nine days.

Los Angeles Branch of A.E.S. will hold its 28th Annual Technical Educational Session and Dinner Dance at Hotel Ambassador, Los Angeles, on Saturday, March 22. General chairman *Phil Simon* has announced that the program, in the main, will follow the pattern of previous years. There will be a technical session from 9 a.m. to 1 p.m., at which talks on current metal deposition subjects will be presented by two out-of-town and one local speaker; a noon-day luncheon, featured by distribution of door prizes from 1:30 to 3 p.m.; and the annual dinner

and ball from 6:30 p.m. till midnight. Several hundred door prizes have been assembled by *Bill Thomas*, chairman of the Door Prize Committee, plus an individual special gift for each lady. Arrangements have been geared for an anticipated attendance of 175 to 200 at the technical sessions and luncheon, and 650 at the dinner dance.

Chairmen of the various committees are: Simon, general chairman; Thomas, door prizes; *G. Stewart Krentel*, program - printing; registration, *Eugene M. Mills*; luncheon, *Kenneth Johnson*; publicity, *Fred A. Herr*; educational, *Frank Virgil*.

Sam Davis, general foreman of the polishing department of the Rheem Automotive Mfg. Co., Fullerton, Calif., has interests in two widely divergent fields of endeavor — polishing foreman and cattle rancher.

According to a news item in the *Rheemotive News*, Sam was born on a ranch owned by his grandfather deep in the heart of Mexico in 1912. For a time he bought and sold cattle and horses and served as a herd rider for drives of as many as 1,000 horses across Mexico. He joined Rheem in 1938 and worked himself up to supervisor of the firm's large bumper polishing division. He also owns a cattle ranch — a 5,000 acre spread in Sonora, Mex., on which he runs about 100 cattle which carry his great-grandfather's original brand. The ranch is operated for him by a cowboy and his family.

In California, Sam owns only one horse now, a saddle bronco, which he uses for weekend riding in Los Angeles County, if and when he can find a road free of automobile traffic.

New spray painting and finishing departments for coating applications on both wood and metal products are included in the plans for a new $500,000 toy manufacturing plant for Mattell, Inc., for which ground-breaking ceremonies were held in January.

The 70,000 square foot concrete structure is being erected at Rosecrans Blvd. and Anza Sts. in Hawthorne, Calif., near Los Angeles. While the new building initially will house spray painting and shipping departments, ultimate plans call for a gradual increase in facilities to house the entire production lines presently headquartered in three buildings at 5432K 102nd St., Los Angeles.

Reduction of manpower by one-sixth, quadrupled output, and increased profits are reported by the Air Research Corp., to have come about as a result of the introduction of modern tumbling methods in the finishing department of the firm's Phoenix, Ariz., plant.

Nine tumblers were installed some time ago, the company reports, and now two shifts of six men with one lead man, working a five-day week, have replaced three shifts totaling 82 men on a six-day week. Production increase has leaped from 12- to 14,000 to between 30,000 and 60,000 pieces of work per week.

The firm's nine tumblers range in size from one the size of a small keg with two compartments, to one measuring 3 x 6 feet with eight loading doors. Parts as large as 12x18" can be handled. Another tumbling unit measures

30x36", with eight doors; and another 24x26" with four doors.

Kelite Corp. of Berkeley, N. J., reports the appointment of *Kenneth C. Edson* as Los Angeles district sales manager. Edson has been placed in charge of sales in one of the two Los Angeles districts of Western sales region. He headquarters at the firm's Los Angeles office.

Resin Formulators, Inc., 8956 National Blvd., Los Angeles, has appointed *James R. Russell* as technical director. He formerly served as chief research engineer for Century Engineers, Inc., Los Angeles, and was previously similarly active with Waldrip Eng. Co. of Hollydale, Calif.

Davis Lott has been named director of sales for the Carl H. Biggs Co. of Los Angeles, manufacturers of the Helix line of epoxy-based bonding agents, potting compounds and protective coatings.

Lott resigned recently as sales manager of the Chemold Co., Santa Monica, Calif.

The Southern California plating industry last fall welcomed back to its ranks an affable young man by name of *Gilbert Bishop* who had worked in various plating shops in the Los Angeles metropolitan area prior to 1948. A few years after the close of World War II Bishop got the notion that the life of a deep-sea fisherman was what he wanted. So he quit the plating business and, for nearly ten years, has been active as a tuna fisherman off the Southern California Coast. Now he is back in plating as a member of the shop crew of Coronado Mfg. Co. in Long Beach, Calif.

Alert Supply Acquired by H-VW-M

Alert Supply Co. of Los Angeles has been acquired by *Hanson-Van Winkle-Munning Co.* of Matawan, N. J., one of the nation's leading manufacturers of electroplating and anodizing equipment, processes and supplies.

Alert, largest West Coast manufacturer of buffing compounds, will retain its corporate identity as a subsidiary of H-VW-M. The firm was organized in 1950, and has shown a steady growth pattern. The management will continue with all personnel holding the same responsibilities. Western sales and technical staffs of H-VW-M will join the Pacific Coast firm under the direction of Alert president, *Alfred E. Perkins*. Volume product lines of both firms will be continued without change.

The H-VW-M Western office moved to the Alert Building at 2041 S. Davie Ave., Los Angeles, on February 1. Alert will continue its San Francisco office at 923 Harrison St.

Manufacturers' Literature

Ultrasonic Cleaners

The Narda Ultrasonics Corp.

Data Sheet No. 600 presents details of the SonBlaster ultrasonic generator model G-601 and related transducers.

The data sheet includes photographs and technical information on two types of submersible transducers and seven different process tanks. Thirteen ultrasonic systems are described.

Of special interest is a list of 35 soils which can be removed by ultrasonic techniques.

136/Circle on Readers' Service Card

High Capacity Chlorinator

Fischer & Porter Co.

Twenty page Catalog 70-15 describes features, construction and application of a vacuum-type, solution-feed, high capacity gas chlorinator suitable for manual, semi-automatic or fully automatic operation in capacities from 60 to 8,000 pounds of chlorine per 24 hours.

137/Circle on Readers' Service Card

Production Ovens

Despatch Oven Co.

The above firm's latest bulletin describes their ovens designed for truck or rack loading. Dimensions are given for standard sizes, as well as construction features.

141/Circle on Readers' Service Card

Power Rectifiers

General Electric Co.

Bulletin GEA-6375A, 12 pages, discusses both silicon and germanium power rectifiers for use in electrochemical processes, aluminum and copper production, electroplating, anodizing, and steel process lines. It explains how high efficiency conversion can be obtained at relatively low cost with semiconductor rectifiers, and describes features and applications of water-cooled and air-cooled designs.

142/Circle on Readers' Service Card

Glass-Lined Pumps

Goulds Pumps, Inc.

A new 16-page booklet on the glassed centrifugal pump includes a brief history of the development of this revolutionary pump and authoritative answers to over 30 of the most frequently asked questions about the pump by chemical and process engineers.

143/Circle on Readers' Service Card

Recording Thermometers

Minneapolis-Honeywell Regulator Co.

Catalog C60-2 describes a complete line of rectangular case filled system thermometers. These indicators, recorders, transmitters, and electric or pneumatic control instruments are covered in detail in the new 56 page catalog.

144/Circle on Readers' Service Card

Hard Chromium Service

Metal Finishers, Inc.

A new four-page folder on the Mecrome process for chromium plating cylinder liners illustrates by means of microphotographs, the uniformly distributed intermediate porosity obtained by the process and the wide variety of sizes and types of cylinder liners that are now being plated.

The folder also describes and illustrates the modern honing facilities and plating equipment especially adapted for plating cylinder liners by the company.

145/Circle on Readers' Service Card

Mechanical Draft Fan

Chicago Blower Corp.

A new four-page bulletin describes forward curve mechanical draft fans. The bulletin, designated FMD-101, contains a chart graphically illustrating the pressure characteristics of the induced draft fans.

146/Circle on Readers' Service Card

Spray-Type Rust Preventive

E. F. Houghton & Co.

Rust Veto Spray, in aerosol-type spray containers is described in a new data sheet, which outlines various properties of the film spray and lists some of its uses.

147/Circle on Readers' Service Card

High Vacuum Equipment

NRC Equip. Corp.

A new 16-page product summary and price list lists a complete line of standard and custom high vacuum components, equipment and systems. It includes all types of mechanical and diffusion pumps, gauges, valves and ac-

148/Circle on Readers' Service Card

149/Circle on Readers' Service Card

cessories such as connectors, switches and feed-throughs.

A wide selection of supplies is also shown in the catalog, with prices for bell jars, gaskets, seals, pump fluids and many related items.

150/Circle on Readers' Service Card

Air Compressors

Davey Compressor Co.

A 4-page folder describes a new line of industrial stationary compressors.

The bulletin, E-269, explains and illustrates operating advantages of the rotary design, particularly stressing how this contributes to true multiple stage compression. It also contains specifications for compressors and accessories.

151/Circle on Readers' Service Card

Industrial Hose

J. N. Fauver Co.

A thirty-two page catalog of industrial hose couplings, stems, swivels, and accessories is divided into ten sections: (1) application, selection and mounting of hose; (2) hose types; (3) reusable type couplings; (4) adaptors for swivel reusable couplings; (5) straight and angle swivels; (6) hose couplings; (7) how to apply hose clamps; (8) how to remove and install circle clamps; (9) hose stems; (10) hose assemblies.

152/Circle on Readers' Service Card

Catalytic Fume Oxidation

Oxy-Catalyst, Inc.

Oxycat catalytic oxidation systems for industrial air-pollution control and heat recovery are described in a new eight-page bulletin. The illustrated literature features four problem-solution case histories of typical catalytic installations. A new package unit tailored for simple, fast installation in a large number of standard applications is described.

The bulletin describes general principles of catalytic oxidation, with text, photos and diagrams to illustrate the various systems available, and explain various construction and design features.

153/Circle on Readers' Service Card

Steam Cleaner

Kelite Corp.

A two-page bulletin, P-7578, describes how the Fireless Steam Cleaner uses live steam from an existing steam supply. In addition to illustrations of the steam cleaner and its steam gun features, the bulletin carries a table of specifications and a list of optional equipment.

154/Circle on Readers' Service Card

Industrial pH Equipment

Beckman/Process Instruments Division

A new eight-page brochure, Bulletin 5400, gives detailed descriptions and specifications for all the manufacturer's industrial pH instruments, electrodes and accessories. The brochure is profusely illustrated with photographs and detailed drawings.

155/Circle on Readers' Service Card

Industrial Heaters

American Air Filter Co., Inc.

A completely new twenty-six page product bulletin, describes the construction, application, and performance features of the Herman Nelson industrial heater. Bulletin No. 750A explains in detail the operation of the heating and ventilating unit that is designed to meet industrial requirements, whether for make-up air or for plant heat load.

161/Circle on Readers' Service Card

Chemicals

Olin Mathieson Chem. Corp.

A 16-page booklet describes the characteristics, grades and containers for 24 basic chemicals used by industry.

The booklet contains information on organic, inorganic and specialty chemicals, and lists the location of the production points for each product.

183/Circle on Readers' Service Card

Rectifier Power Conversion Systems

General Electric Co.

Bulletin GEA-6684, 16 pages, discusses use of semiconductor rectifier systems for supplying d-c power for electrochemical processes, electroplating, anodizing, aluminum reduction, and copper refining. Publication explains advantages of systems approach, lists features of General Electric systems, describes four methods of meeting d-c power requirements for electrolytic processes, discusses application of power conversion systems, and provides technical data on performance characteristics of rectifier systems.

162/Circle on Readers' Service Card

Face and Eye Shields

Sellstrom Mfg. Co.

Just off the press is a colorful new catalog featuring a complete line of face and eye protection equipment. The 28-page brochure illustrates and describes such products as goggles, glasses, lenses, welding helmets, hand and face shields and respirators.

163/Circle on Readers' Service Card

Pumping Metal Etch Solutions

Vanton Pump & Equip. Corp.

A case history of how sealless plastic pumps resolved the difficult problem of conveying corrosive metal etching fluids for the Westinghouse Electric Corp.'s printed circuit plant in Metuchen, N. J., has been prepared in a four-page reprint.

164/Circle on Readers' Service Card

Metal Stripper

MacDermid, Inc.

Metex Metal Stripper, a liquid acid immersion stripper, which will remove from stainless steel or aluminum all coatings except heavy chromium and precious metals, is described in Technical Data Sheet No. 46, a three-page usage and instruction bulletin.

165/Circle on Readers' Service Card

(*Continued on page* 129)

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3 times	11.00
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PLATERS AND ANODIZERS

M-G SETS — Motor 3-60-220/440

Amp.	Volt	Make
175	14	Delco
200	7½	Chandeysson
300	7½	Hobart
400	60/60	G. E.
750/375	6/12	Excel
940	32	Elec. Prod.
1000/500	6/12	Chandeysson
1500/750	6/12	H-V-W
1500	15	Star
1500	30/50	Century
1500	40/65	G. E.
1500	65	Westinghouse
1500	70	Century
2500/1250	6/12	Elec. Prod.
5000/2500	6/12	Chandeysson
5000/2500	6/12	Columbia
5000/2500	9/18	Chandeysson

SHUNTS

5,000 Amp., 50 mv.
6,000 Amp., 50 mv.
10,000 Amp., 50 mv.
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DEGREASER FOR SALE

Aeroil gas fired degreaser 7' x 3' x 5', rinse tank 5' x 4'. Wheelabrator cabinets, tumblast, sand blasting cabinets, dust collectors dry sludge. Buffalo steam heating exhaust, ventilation fans, air compressors.

M. ELSTEIN
426 Grand St. Jersey City 2, N. J.

PLATING MACHINE WANTED

Udylite Cyclemaster (or equivalent) full automatic plating machine suitable for cadmium or zinc plating.

MR. ROBERT
2137 Walnut St. Chicago 12, Ill.

EQUIPMENT BUYS OF 1958

1—UDYLITE RETURN TYPE FULLY AUTOMATIC HORIZONTAL ZINC OR CADMIUM PLATING MACHINE — COMPLETE WITH HIPPER DIPPER DRYER. Built in 1955. 16 x 36 inch cylinders. Bright dip and dichromate — can be skipped or delayed (this machine can be inspected under power at our plant).

1—UDYLITE FULLY AUTOMATIC RACK PLATER — FOR ZINC OR CADMIUM. 18 inch rack centers — 38 feet long — 42 inch deep tanks — overall height 8 feet.
3—STEVENS AUTOMATIC BARREL PLATERS MODEL C — 57 barrels per machine. Can redesign to fit your cycle.
1—HANSON-VAN WINKLE AUTOMATIC RACK MACHINE 2 LANE. Large machine.
1—STEVENS FULLY AUTOMATIC RACK MACHINE 2 LANE MEDIUM SIZE.

GENERATORS

1—10,000 ampere at 9 volts — 25 degree rise CHANDEYSSON.
3—7500 ampere, 12/24 volts ELECTRIC PRODUCTS built in 1951. Like new.

RECTIFIERS

10—UDYLITE STANDARDS 1500/750 amperes 12/24 volts.

FILTERS

6—Size 18 x 48 x 40, type SCW-2 INDUSTRIAL
3—Size 36 x 36 x 30 SCW-2 INDUSTRIAL
2—RDR-2 36 x 36 x 30 SCW-2 INDUSTRIAL

LARGEST INVENTORY OF AUTOMATIC PLATING MACHINES IN THE COUNTRY.

ENGINEERING INFORMATION ON THE ABOVE LISTED EQUIPMENT — AS WELL AS ON HUNDREDS OF ITEMS AVAILABLE FROM OUR STOCK.

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PLATING SERVICE AND EQUIPMENT CORP.
3620 HART STREET DETROIT 14, MICH.
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INQUIRIES FROM DEALERS INVITED

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VACUUM METALIZING • LACQUERING AND ENAMELING

SITUATIONS OPEN

BUFFING COMPOUND SALESMEN

SITUATION OPEN — Distributors, jobbers and manufacturers agents wanted to distribute and sell the full line of Schaffner's polishing and buffing composition in bar, spray or paste form, and a complete line of polishing room supplies.

SCHAFFNER MANUFACTURING COMPANY, INC.
Emsworth, Pittsburgh 2, Pa.

SALESMAN

SITUATION OPEN—Excellent opportunity for salesman presently calling on trade — plating barrel repairs, new barrels; parts all types, gears, panels, doors, bearings, all materials, etc. Address: February 1, care Metal Finishing, 381 Broadway, Westwood, N. J.

TECHNICAL DIRECTOR

SITUATION OPEN—Medium size shop, vicinity New York City. Burnishing, copper barrel plating, nickel barrel plating and gold barrel plating of small parts. To be in complete charge of time study, work flow analysis, quality control and price estimates. Salary $9,000 to start. Advancement to assistant general manager and eventually to general manager. Address: October 6, care Metal Finishing, 381 Broadway, Westwood, N. J.

SALESMAN

SITUATION OPEN—Salesman wanted for cleaners and other chemicals for the finishing industry. North Jersey territory available, which includes Long Island, metropolitan New York City and New Jersey (New Brunswick and north). Must reside in New Jersey. Prefer a man 25-35 years old, with 3 to 4 years experience in metal finishing. College degree preferred but not necessary. Salary, bonus, expenses, company car. Address: March 1, care Metal Finishing, 381 Broadway, Westwood, N. J.

SALES REPRESENTATIVE

SITUATION OPEN—Metal sales engineer capable of negotiating with prime industry relative several exclusive basic materials. Following among manufacturers or stampers using electroplated pre-finished strip, aluminum with highest anodizing capability, other metals for decorative trim or with critical polished surfaces, helpful though not essential. Expanding sales program offers several key areas and excellent opportunity for right man. Write full particulars, background and references to: March 2, care Metal Finishing, 381 Broadway, Westwood, N. J.

CAN YOU SELL INDUSTRIAL METAL CLEANERS?

Nationally known manufacturer of industrial metal finishing chemicals needs experienced, ambitious, aggressive salesman 28 to 50 years old to sell and demonstrate cleaners, phosphate coatings, aluminum processing chemicals and other special items. If you have been a plater, enameler or other metal finisher and have sold to this field, you may qualify.

Would cover rich potential in Wisconsin and northern Illinois. Salary, expenses, company car, profit sharing and other benefits.

Write for interview giving phone number, age, selling experience and metal finishing experience or training. Address: March 7, care Metal Finishing, 381 Broadway, Westwood, N. J.

SITUATIONS WANTED

PLATING SUPERVISOR

SITUATION WANTED—16 years of job shop and manufacturing production plating experience. Also anodizing, dyeing and bright finishes. Analyze all solutions. Excellent chemical and metallurgical background. Ohio resident. Locate anywhere. Address: January 4, care Metal Finishing, 381 Broadway, Westwood, N. J.

CHEMIST-ELECTROPLATER

SITUATION WANTED—36 years of age. Experienced in all phases of electroplating and anodizing, including control, development, and production. Primarily interested in deposition of noble metals and printed circuitry. Will consider relocation for position offering outstanding opportunity. Address: March 5, care Metal Finishing, 381 Broadway, Westwood, N. J.

SALES

SITUATION WANTED—Experienced sales person, widely known in metal working and finishing industry with 18 years successful record desires new company affiliation. Will consider manufacturer's agent arrangement on several non-competitive lines. Philadelphia headquarters. Address: March 3, care Metal Finishing, 381 Broadway, Westwood. N. J.

ELECTROCHEMIST

SITUATION WANTED—Electrochemist, age 36, B.S. degree. Extensive experience in all phases of electroplating including control, research, trouble shooting and production. Extensive experience in plating on magnesium. Desire midwest location. Address: March 4, care Metal Finishing, 381 Broadway, Westwood, N. J.

FOREMAN POLISHER

SITUATION WANTED—I have many years experience on all metals. Capable of handling men and teaching beginners. Production and estimating on all types of work—floor lamps, hardware, silverware, plumbing supplies, jobbing shops and chandeliers and electrical fixtures. Desire position in either metropolitan New York or within commuting distance. Address: February 3, care Metal Finishing, 381 Broadway, Westwood, N. J.

FOREMAN PLATER

SITUATION WANTED (in Florida area only)—Twenty-five years experience in copper, nickel, chromium, silver, brass, cadmium-zinc, phosphate coatings. Barrel and still tank operation; polishing, buffing and job or production work. Forty years old, married 17 years, have 3 children. Address: December 4, care Metal Finishing, 381 Broadway, Westwood, N. J.

SUPPLIERS OF EQUIPMENT AND MATERIALS AND ADVERTISERS INDEX

Manufacturers' Literature

(*Continued from page* 123)

Vacuum Metalizing

Vacuum Equip. Div., F. J. Stokes Corp.

This process of depositing a thin metallic film by evaporation and condensation under high vacuum conditions is fully described and many of its applications are illustrated in a brochure, catalog No. 780, of which a revised and up-to-date version has just been issued.

The brochure also contains complete specifications for all the current models of the manufacturer's vacuum metalizing equipment.

170/Circle on Readers' Service Card

Plate Coils

Dean Thermo-Panel Coil Div., Dean Products, Inc.

This bulletin gives both design and price information. It also tells how to do one's own estimating. Other subjects are: Length and Width Variations; Handles and Hanger Brackets; Surface Treatment; Zinc Metalizing; Edge Sealing Weld; To Make a Closed Cylinder; Half-Couplings or Pipe Nipples; and Data for Replacing Old-Fashioned Pipe Coils.

171/Circle on Readers' Service Card

Copper Anodes

The American Metal Co., Ltd.

An eight page, illustrated brochure is available on copper in plating anodes which gives information on copper refining, a table on comparative analyses of various coppers, a flow chart of copper production, and characteristics of the various types of copper in platers' anodes.

172/Circle on Readers' Service Card

Compounds for Barrel Finishing

Magnuson Products Corp.

"Permag Compounds for Barrel Processing" is the title of a new booklet, prepared in manual form so as to be of maximum value to shop men and engineers.

The manual is indexed to cover an introduction, general information, process information on 11 topics, and the work defined by numerous case histories. There are illustrations of typical units of equipment and media.

Miscellaneous information on calculation of volumes of octagonal and hexagonal barrels, an inquiry form to expedite responses to requests on information, and a listing of available compounds for barrel processing operations completes the manual.

173/Circle on Readers' Service Card

Acid-Proof Lining

Maurice Knight Co.

A new "Pyroflex" bulletin on the properties and use of this acid-proof tank lining is now available. The 8-page illustrated bulletin gives complete specifications, instructions and application data.

174/Circle on Readers' Service Card

Barrel Finishing

Roto-Finish Co.

A new 24-page, 4-color catalog sets forth a clear explanation of mechanical finishing processes, and answers some of the basic questions to the problem of achieving large-quantity production runs while maintaining exact tolerances and uniformity of finish.

Included are illustrations and descriptions of equipment by model number, basic machine dimensions, compartment capacities, and recommended work loads. Standard accessories such as separators, controls, screens, chip bins, dip tanks, and centrifugal dryers are also listed.

A flow diagram showing a variety of special systems illustrates the many combinations of tailor-made processes available for completely automating

March 1958

READER SERVICE DEPARTMENT — METAL FINISHING

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READER SERVICE DEPARTMENT

METAL FINISHING

PEOPLES TRUST BUILDING

WESTWOOD, NEW JERSEY

metal parts finishing on a large scale basis.

175/Circle on Readers' Service Card

Grinding Wheel Data Book

Simonds Abrasive Co.

The above firm has issued a 125 page, illustrated booklet on its grinding wheels. It gives detailed information on the types made by the firm, size, and grade of hardness; a wheel selection table; standard shape types of grinding wheels; grinding wheel speeds; abrasive grains; plus operating rules and general data.

176/Circle on Readers' Service Card

Phosphating Compounds

Oakite Products, Inc.

CrysCoat No. 89, an iron phosphating compound that cleans and phosphates metal at the same time; and CrysCoat HC, a zinc phosphating compound designed to give a heavy coating in tank application, are the subjects of two folders.

The folders give step by step instructions for the use of these two products.

177/Circle on Readers' Service Card

Fume Scrubbers

Heil Process Equip. Corp.

Clear pictures and vivid, detailed descriptions make a new bulletin on fume scrubbers both interesting and extremely informative. Bulletin B-71 shows scrubbers used in chemical plants, metal treatment, electroplating, refining, acid pickling, anodizing, and in laboratories. Numerous kinds of construction are pictured, including solid plastic, reinforced plastic, rubber and plastic lined steel, and stainless steel. Cases are given showing both wet cyclone and packed tower types of scrubber. The bulletin offers information on cfm handled, corrosive agents removed by the scrubbers, and the industry or process in which each type of scrubber is employed.

178/Circle on Readers' Service Card

Power Rectifiers

Sel-Rex Corporation

A fully illustrated, 32-page guide to metallic power rectifiers, utilizing germanium, silicon and selenium semiconductors, covers widely varied applications for rectifier equipment.

For each application there is a detailed description, including operational characteristics, of the components used, such as semiconductor elements, transformers, output regulators, automatic remote controllers, magnetic amplifiers, etc.

179/Circle on Readers' Service Card

Conveyor Chain

The Alvey-Ferguson Co.

A new bulletin illustrates and describes A-F Engineered Conveyor Chain. In addition to containing dimensional prints of various sizes of special conveyor chain, both with and without attachments, the new bulletin includes installation photographs showing its use in slat conveyors, pusher bar boosters and as side chains for open types of belting in metal cleaning and processing machines.

180/Circle on Readers' Service Card

Belt Polishing

Behr-Manning Co.

Selection of offhand belt finishing materials and equipment is simplified by means of an illustrated wall chart, on which proper abrasives, grit, belt speed, lubricant and contact wheel are listed for 16 of the most popular metals and alloys. Eleven types of contact wheels are described. Information includes types of surfaces, hardness and density, wheel action and the advantages of each type of contact wheel.

On durable card stock, the 15" x 27" chart is designed to be hung in tool rooms and work areas.

181/Circle on Readers' Service Card

Testing Instruments

Gardner Laboratory, Inc.

The new 1958 112-page catalog describes testing instruments available for paint, plastics, ceramics, oil, rubber and other materials.

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PEOPLES TRUST BUILDING

WESTWOOD, NEW JERSEY

March 1958

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We manufacture (products) _____

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PRECIOUS METALS PROCESSES

BRIGHT GOLD* — Mirror-bright finish in any thickness directly from the bath.

RHODEX† — Only rhodium electroplating process that yields extra heavy compressively stressed deposits.

SILVER SOL-U-SALT — non-dusting — safest and easiest to use.

BRIGHT RHODIUM — Brilliant, fine-grained, non-tarnishing deposits.

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KARATCLAD #369 — ACID GOLD PROCESS — Absolutely no free cyanide — plates bright in any thickness at room temperature.

† *Patent Pending.* * *Patented.*

THE NEW JET PLATER

A complete, versatile, small-volume plating unit for precious metals plating. Incorporates a built-in rectifier with timer and other automatic features for high speed, quality work.

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Custom-built to your requirements at the price of ordinary mass-produced equipment.

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Increase production because they are the fastest-cleaning filters on the market.

Whatever your plating problem — precious metals, power, equipment or procedures — Sel-Rex Representatives are trained to "Custom Engineer" solutions to our mutual profit. Send for FREE technical data and case histories and see for yourself . . . we may have solved your problem last month.

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Manufacturers of Exclusive Precious Metals Processes, Metallic Power Rectifiers, Airborne Power Equipment, Liquid Clarification Filters, Metal Finishing Equipment and Supplies.

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LET SPECIALISTS FIT A COPPER-PLATING PROCESS TO YOUR JOB

MacDermid's complete line of copper-plating processes assures high quality ... reduced costs ... faster plating

Rocheltex

A liquid bath additive that produces more uniform copper deposits at high current densities. Improves all cyanide copper solutions. Has reduced operating costs up to 50% because of improved anode solution and bath efficiency. Also recommended for strikes, heavy deposits to be buffed, heat treat stop-off and other engineering applications.

CI Bright Copper

Bright, high speed bath recommended where trouble-free process is desired. Has all the advantages of Standard Bright Copper, yet plates 2 to 3 times faster and maintains this rate. One stable, non-metallic brightener used. Outstanding characteristic is freedom from roughness and tolerance to common impurities. Most copper baths can be converted to CI.

Standard Bright Copper

A moderate rate cyanide copper of good lustre. Easy to control, trouble-free. Only simple steel equipment is required. One brightener. Free rinsing, cleaning not required before nickel plate. Recommended where reliability and freedom from attention are more important than high speed or extreme brilliance. Proved by 12 years of service.

Z/T Bright Copper

An entirely new high-speed cyanide plating process that produces extremely bright copper deposits. Recommended where maximum brightness at high speed is desired. Chrome can be plated directly over Z/T Copper with excellent final brightness.

Write us or call your MacDermid representative for full information on these processes and the MACDERMID CHROME REMOVAL PROCESS. He has the know-how to recommend and service complete finishing cycles. Let him help you cut costs, reduce rejects and improve the finish of your products.

MacDermid ...right to the Finish!

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